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ABSTRACT

A brief introductory section contains the rationale for the course, the curriculum framework, a curriculum paradigm which indicates the approximate time ranges for each section, and notes on use of the guide. The guide itself is divided into units and subunits covering the following areas: Orientation to Pulpwood Harvesting; Tree Identification; Buying Pulpwood Timber (cruising, planning the legal aspects, establishing price, and exploring careers); Harvest Planning and Management (system selection, machinery and equipment selection, operational planning, cost analysis, records and insurance, and exploring careers); Harvest Operations (felling, limbing, and bucking, skidding and prehauling, loading and hauling, and exploring careers); and Pulpwood Mechanics (general shop skills, engine principles, small gasoline engines, engine troubleshooting and repair, hydraulics, major systems of a vehicle, machinery and equipment maintenance, and exploring careers). The material covered is presented under four headings: objectives, learning activities, topics, and resources. Additional resources are listed at the end of each subunit. Appendixes include a list of necessary facilities and equipment, a partial listing of professional and technical organizations, and a bibliography. (SA)

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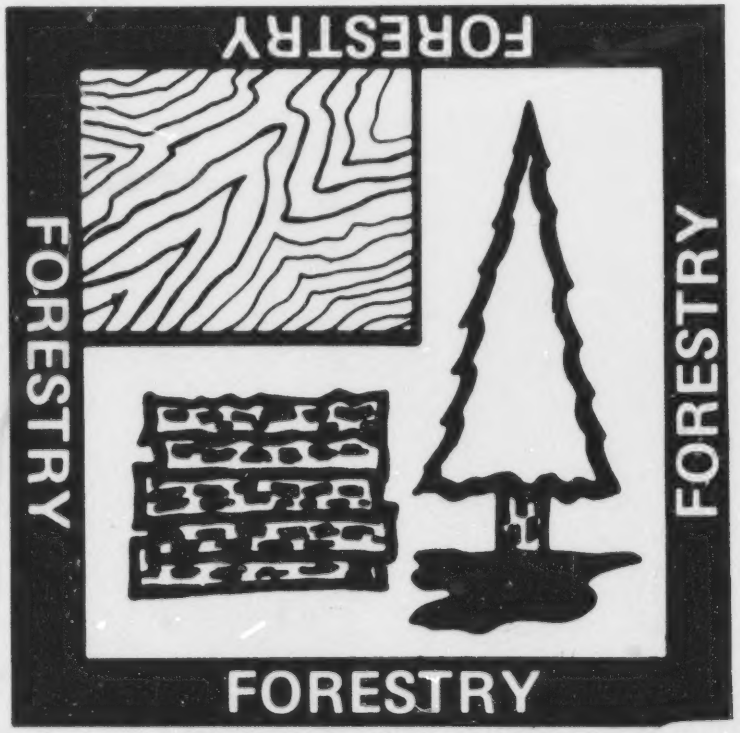
HARVESTING PULPWOOD



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PRELIMINARY DRAFT

CURRICULUM GUIDE

Pulpwood Harvesting

A Curriculum Guide

Preliminary Draft

Prepared by:

State Department of Education
Office of Vocational Education
Agricultural Education Section
Columbia, South Carolina 29201

In Cooperation With:

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1973

Foreword

This curriculum guide was developed as a part of a larger project to revise the total agricultural education curriculum in South Carolina. The project was designed to implement the following changes:

- provide a more comprehensive vocational offering
- place a greater emphasis on behavorial objectives
- place a greater emphasis on learning activities
- encourage an inductive approach to teaching
- result in the re-identification of the units of instruction

Units of instruction for each course were developed which include behaviorally stated objectives, suggested learning activities, a topic outline, and suggested resources.

Frank R. Stover, State Supervisor
Agricultural Education

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The final copy was edited by Dr. R. J. Mercer, Vocational Instructional Materials Specialist, Vocational Education Media Center, Clemson, South Carolina.

Illustrations were prepared by R. D. Mattox, Art Director, Vocational Education Media Center, Clemson, South Carolina.

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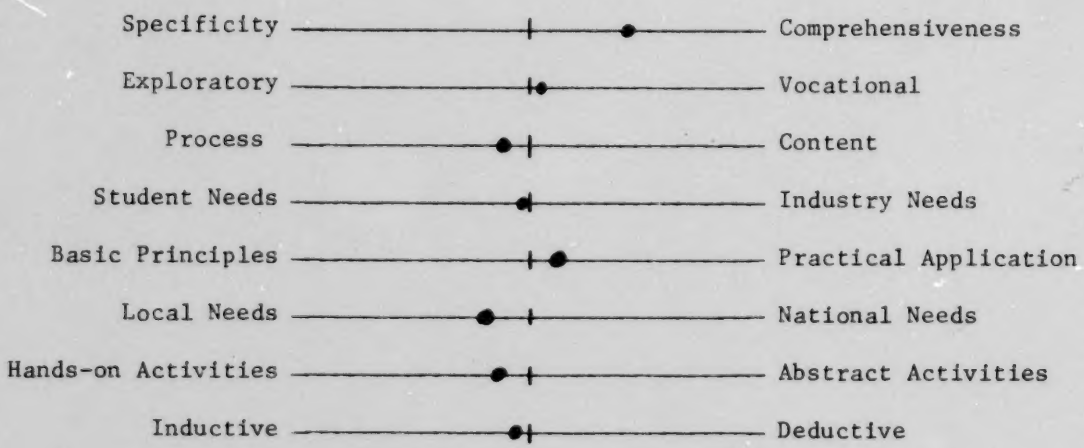
Rationale for the Course

Pulpwood as a crop is sold and harvested in every county in South Carolina. Production has increased from 50,000 to 2.4 million cords over the last 35 years. Increased mechanization of harvesting operations and advances in forest management technology demand trained personnel for positions in this field. To continue to grow and meet material demands the current work force of nearly 7,000 will need to expand and be taught necessary job skills.

Several schools in the state already offer courses in pulpwood harvesting - others could benefit from such a course. It is hoped that this curriculum guide will encourage teachers to implement such a course where the need exists.

Curriculum Framework

The designers of this course used the following continuums to frame their thinking as they constructed the course. The designers tried to consider both ends of these continuums. The biases of the committee are indicated below. For example, the committee felt that at the high school level they would prefer comprehensiveness to specificity. In other words, they felt that to be taking a course in pulpwood harvesting is specialization enough at the high school level. Hence, within the context of the course as indicated by the dot on the continuum, the committee leaned toward comprehensiveness.



CURRICULUM PARADIGM
PULPWOOD HARVESTING

Buying Pulpwood Timber	Harvest Planning and Management	Harvesting Operations	Pulpwood Mechanics
	Orientation (FFA, Career Exploration, Supervised Practice)		1 Week
	Tree Identification	1 Week	
Cruising 3 weeks	System Selection 2 weeks	Felling Limbing and Bucking 3 weeks	General Shop 2 weeks
	Machinery & Equipment Selection 2 weeks	Skidding and Prehauling 3 weeks	Engine Principles 1 week
Legal Aspects 1 week	Operational Planning 2 weeks		Small Gasoline Engines 2 weeks
Establishing Price 1 week	Cost Analysis 1 week	Loading and Hauling 3 weeks	Engine Trouble Shooting and Repair 2 weeks
	Records and Insurance 1 week		Hydraulics 2 weeks
			Major Vehicle Systems 1 week
			Machinery and Equipment Maintenance 1 week

Exploring Careers ½ week

Exploring Careers ½ week

Exploring Careers ½ week

Exploring Careers ½ week

Use of the Guide

This guide is not a textbook. It is, as entitled, a curriculum guide. It is not designed to provide content, but to refer to content. It is designed to ask the prior questions - what should be taught and to some degree how and with what resources. The objectives are not behavioral in the truest sense - they may be closer to goals. Hopefully they help spell out the expected outcomes of the course. It was felt that the teachers of the course could determine the "givens" of the objectives and set their own "performance standards" as needed for a particular class or individual.

The general framework of the course is problem solving. To this degree, it is a functional approach. Hopefully, most units will be taught inductively, i.e., the teacher will begin with a practical problem or project and back up to basic principles. It is also hoped that most of the learning activities will be "hands-on" type activities although the importance of vicarious learning is recognized.

This curriculum guide was designed as a one year course; however, it is felt that in some schools a two year course may be desirable. If the guide is to be used for such a course, it is recommended that each unit be expanded. The proportionate amount of time spent in each area would remain the same.

UNIT: Orientation to Pulpwood Harvesting

OBJECTIVE(S): The student will be able to:

I. Describe in outline form the course in pulpwood harvesting.

II. Prepare in outline form a plan for integrating the FFA program and the course.

III. Prepare in outline form a supervised practice program which will enrich the course.

IV. Plan an occupational work experience program to complement the course in pulpwood harvesting.

V. Prepare a plan for exploring careers in pulpwood harvesting.

VI. .....

UNIT: Orientation to Pulpwood Harvesting
SUB-UNIT:

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Describe in outline form the course in pulpwood harvesting.	I. Assign a committee to each of the major units and have them critique the unit and report their results to the class with suggestions for change.
A. List the major objective(s) of each unit.	. Observe a presentation by the instructor of the course model via overhead projection.
B. List the major learning activity(s) to be accomplished in each unit.	. .....
C. List the major topic(s) to covered in each unit.	
D. List the major resources to be used in each unit.	
E.	
II. Prepare in outline form a plan for integrating the FFA program into the course in pulpwood harvesting.	II. Prepare a list of proposed pulpwood harvesting projects for FFA.
A. List possible home or community improvement activities involving pulpwood harvesting which could become projects for FFA.	. Enter FFA contests related to pulpwood harvesting occupations.
B. List pulpwood harvesting projects suitable as part of the BOAC program.	. Prepare radio or TV programs concerning pulpwood improvement projects in the local community.
C. List some of the possible radio or TV programs that could be built around pulpwood harvesting.	. .....
D. List some of the team contests that are related to the course.	

UNIT: Orientation to Pulpwood Harvesting

SUB-UNIT:

TOPICS	RESOURCES
I. The pulpwood harvesting course. A. Objectives B. Learning activities C. Topics D. Resources, facilities, and equipment E.	I. The curriculum guide.
II. FFA as an integral part of the course. A. Committee projects relating to pulpwood harvesting B. Pulpwood projects related to the BOAC program C. Contest relating to the course . team . individual D. FFA summer camp E. TV and radio program projects F.	II. Bender, et al., The FFA and You.

UNIT: Orientation to Pulpwood Harvesting
SUB-UNIT:

OBJECTIVES	LEARNING ACTIVITIES
E. List some of the individual contests related to the course. F.	
III. Prepare in outline form a supervised practice program which will enrich if not form the core of the course. A. List at least two possible home production projects related to pulpwood production. B. List at least two possible home improvement projects related to improving the home forest. C. List at least two supplementary farm jobs related to improvement of the home forest. D.	III. Conduct a home production project related to pulpwood harvesting, e.g., harvesting a small plot. . Perform a supplemental home or farm job related to pulpwood harvesting, e.g., remove diseased trees on a home farm forest. . Perform a home improvement project related to harvesting. . .....
IV. Plan an occupational work experience program to complement the course in pulpwood harvesting. A. List at least ___ work stations in your community which would provide training in occupations related to the course. B. Prepare a brief work schedule for occupational work experience at one such station. C.	IV. Make plans for and/or obtain a part-time job in a pulpwood harvesting occupation which will help prepare for a future career. . Prepare a work schedule for a chosen work station. . .....

UNIT: Orientation to Pulpwood Harvesting

SUB-UNIT:

TOPICS	RESOURCES
III. Integration of the supervised practice program into the course. A. Productive projects B. Home improvement projects C. Supplementary farm jobs D.	III. Miller. Supervised Practice in Vocational Agriculture. . .....
IV. Occupational work experience in pulpwood harvesting careers. A. Locating work experience stations B. Job schedules C.	IV. Binkley. Experience Programs for Learning Vocations in Agriculture, Chapter 28. . Fuller. Education for Agricultural Occupations. . Hoover. Handbook of Agricultural Occupations, Chapter 13. . .....

UNIT: Orientation to Pulpwood Harvesting
SUB-UNIT:

OBJECTIVES	LEARNING ACTIVITIES
V. Prepare a brief plan for exploring careers in pulpwood harvesting. A. List at least ___ test which can be used to analyze personal strengths and weaknesses. B. List at least ___ criteria for evaluating careers. C. ..... VI.	V. Ask for an interview with your guidance counselor to discuss your strengths and weaknesses. . As a class project, try to set up a list of guidelines for evaluating careers as each career area is explored during the course. . ..... VI. .....

UNIT: Orientation to Pulpwood Harvesting

SUB-UNIT:

TOPICS	RESOURCES
V. Career explorations A. Personal assessment . Aptitudes . Attitudes . Skills . General competencies B. Criteria for career evaluation	V. Hoover. Handbook of Agricultural Occupations, Chapter 1. . .....
VI.	VI. .....

RESOURCES

UNIT: Orientation to Pulpwood Harvesting

BOOKS

Bender, Ralph E.; Clark, Raymond and Taylor, Robert E. The FFA and You. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1962.

Binkley, Harold and Hammonds, Carsie. Experience Programs for Learning Vocations in Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

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Fuller, Gerald R. Education for Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Miller, Texton R. Supervised Practice in Vocational Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc.

FILMS AND FILM STRIPS

TRANSPARENCIES

UNIT: Tree Identification

OBJECTIVE(S): The student will be able to:

I. Select from a given forest area the species of trees suitable for pulpwood and rank them as to quality for a given manufacturing process.

II. .....

UNIT: Tree Identification
SUB-UNIT:

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Select from a given forest area the species of trees suitable for pulpwood and rank as to quality for a given manufacturing process.	
A. Identify at least 5 species of trees which are harvested for pulpwood in the local community.	I-A. Interview a local pulpwood buyer to determine the species of wood suitable for pulpwood in your community. . Locate tree species suitable for pulpwood in local forest and observe such identifying characteristics, e.g., tree form, leaf type and form, fruit type and form, etc.
B. Identify tree species by leaf form, arrangement or composition.	B. Obtain and use a tree identification guide containing leaf types, form, etc., for identifying these species if necessary.
1. Recognize by sight at least 3 trees commonly used for pulpwood in the local community.	. Practice using a key for identifying tree species suitable for use as pulpwood.
2. With the use of an identification key, identify at least 2 unknown trees used for pulpwood.	. Participate in a tree identification contest.
a. Identify at least 10 major leaf forms.	.....
b. Identify at least 5 major fruit types.	
c. Identify at least 3 major leaf arrangements, e.g., alternate, opposite, etc.	
d.	
II.	II. .....

UNIT: Tree Identification

SUB-UNIT:

TOPICS	RESOURCES
I. Species Selection	
A. Tree species suitable for pulpwood	I-A. Bromley. Pulpwood Production, pp. 4-12.
1. Pines .loblolly .slash	. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson five.
2. Other	. .....
B. Species Identification	B. Bulletin: Familiar Trees in South Carolina.
1. By sight	. Filmstrips: Identifying Common Tree Species. Filmstrips I, II, and III.
2. By key .leaf forms .leaf types .fruit types	. .....
3.	
II.	II. .....

UNIT: Tree Identification
SUB-UNIT:

OBJECTIVES	LEARNING ACTIVITIES
C. Rank the five trees most commonly used for pulpwood in South Carolina according to quality. 1. List at least five desirable characteristics of wood to be used for pulpwood. 2. Given two samples of wood--the student will be able to select the one most suitable for pulpwood. 3. ..... D. ..... II.	C. Observe drawings and/or samples of wood of desirable and undesirable trees and compare. . Observe microscopic samples of desirable and undesirable wood. . Visit a local paper mill and observe the manufacturing of paper. . Interview pulpwood buyers to determine the characteristics of desirable pulpwood. . ..... D. ..... II. .....

UNIT: Tree Identification
SUB-UNIT:

TOPICS	RESOURCES
C. Wood quality determination	C. Bromley. Pulpwood Production, pp. 4-12.
1. Characteristics of desirable wood for paper manufacture.	
. Weight	
. Density	
. .....	
2. Wood identification	
. Without microscope	
. With microscope	
. .....	
3.	
D.	D. .....
II.	II. .....

RESOURCES

UNIT: Tree Identification

BOOKS

Bromley, W.S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., second ed., 1969.

Kirkley, Frank E., et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Office of Vocational Education in cooperation with the Vocational Education Media Center, 1973.

FILMS AND FILM STRIPS

Colonial Films, Atlanta, Georgia. Identifying Common Tree Species. Filmstrips I, II, and III.

BULLETINS

S.C. State Commission of Forestry. Familiar Trees in South Carolina. A manual for Tree Study. Bulletin 117., Box 287, Columbia, S.C., 29202

TRANSPARENCIES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Cruising Pulpwood

OBJECTIVE(S):

I. Given the necessary equipment and a map of the tract, the student will be able to estimate within 5% of the actual volume the amount of pulpwood present on a given tract.

II. .....

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Cruising Pulpwood

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Given the necessary equipment and a map of the tract, the student will be able to estimate (within 5% of the actual volume) the amount of pulpwood on a given tract. A. Given a scale map and the total acreage of a tract of pulpwood, the student will be able to perform a 5% or 10% cruise which estimates within 5% the actual volume the amount of pulpwood on a given tract. 1. Given the acreage of a tract, the student will be able to determine the number of 1/4 or 1/5 acre plots need for a 5 or 10% cruise. 2. Given a scale map of an aerial photograph of a tract, the student will be able to uniformly locate the 1/4 or 1/5 acre plots to be cruised. 3. The student will be able to step-off a 1/4 or 1/3 acre plot. 4. Given a chain or yard tape, the student will be able to determine within 5% of the actual acreage the total area of a given tract. 5. Given a compass and chain or yard tape, the student will be able to locate the plot centers. 6.	I-A. As a class project cruise a tract of timber in the local community using a 5 or 10% sample. . Obtain a map or photograph of the tract and determine acreage if not given. . As a class project measure the acreage in the tract using a chain. . Individually or as a class prepare a survey grid. . Observe demonstrations of and/or individually or in groups practice using a compass to locate the plot centers on the actual tract. . Observe demonstrations of and/or layout a 1/4 or 1/5 acre plot.

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Cruising Pulpwood

TOPICS	RESOURCES
I. Cruising pulpwood A. Quantity estimation 1. Sampling procedures 2. Determining number of plots needed for sampling 3. Locating plots on map 4. Locating plots on site 5. Measuring plots 6. Measuring tract 7.	I. Bromley. Pulpwood Production. pp. 31-40. . Kirkley. Basic Forestry for Vocational Students in South Carolina. . Anderson and Smith. Forests and Forestry. Chapter 3 . .....

UNIT: Buying Standing Timber for Pulpwood
SUB-UNIT: Cruising Pulpwood

OBJECTIVES	LEARNING ACTIVITIES
B. Given a clinometer and diameter tape, the student will be able to determine the volume of wood in a given tree.	B. Observe demonstrations of and/or individually determine the volume of a tree using a Biltmore stick.
1. Given a Biltmore stick, the student will be able to determine the value of pulpwood in a given tree.	. Observe demonstrations of and/or individually determine the volume of a tree using a clinometer and a diameter tape.
2. Given a clinometer and a diameter tape, the student will be able to determine the volume of a given tree.	. Conduct a contest among teams of students to determine which team can most accurately estimate the volume of a 1/4 or 1/5 acre plot of standing pulpwood.
3.	. Observe demonstrations of and/or use the dot tally system to record plot volumes.
C. The student will be able to correctly use the dot tally method of recording the volume of timber cruised.	. .....
D. Mark trees for selective cutting according to product, i.e., pulpwood, poles, saw timber, etc.	
E.	
II.	II. .....

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Cruising Pulpwood

TOPICS	RESOURCES
B. Tree volume determination	B.-E. Bromley. Pulpwood Production. pp. 31-40.
1. Use of Biltmore stick	. Kirkley. Basic Forestry for Vocational Students in South Carolina.
2. Use of clinometer and diameter tape	. Anderson and Smith. Forests and Forestry. Chapter 3.
3.	. Local pulpwood buyers
C. Use of the dot-tally	. .....
D.	
E.	
II.	II. .....

RESOURCES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Cruising pulpwood

BOOKS

Anderson, D. A. and William A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., second ed., 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Office of Vocational Education in Cooperation with the Vocational Education Media Center, 1973.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Planning the Legal Aspects of Acquistion

OBJECTIVE(S):

I. The student will be able to plan the legal procedure necessary for acquiring a given tract of pulpwood.

II. .....

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Planning the Legal Aspects of Acquisition

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Plan the legal procedure necessary for acquiring the standing pulpwood from a given tract.	I-A. Prepare a fictitious contract for purchasing an actual tract of pulpwood in the local community.
A. Prepare a contract for purchasing a tract of standing pulpwood.	. Ask a local buyer to review your contract with the class.
1. Describe in writing at least three different types of contracts commonly used for purchasing standing pulpwood.	. Prepare a contract check list.
2. List at least two advantages of each type of contract.	. .....
3. List at least 10 items which should be present in a typical contract.	
4.	
B. List the items which must be considered to determine the seller's right to sell.	B. Interview a local lawyer who has experience in dealing with land titles to discuss such titles with the class.
1. Determine when a lawyer is needed.	. Take a fieldtrip to the local courthouse and request a title search for a tract of pulpwood in the local community.
2. Request a title search.	
3.	
II.	II. .....

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Planning the Legal Aspects of Acquisition

TOPICS	RESOURCES
I. Legal aspects of acquisition A. Contracts 1. Specifications . size of tree to be cut . species of tree to be cut . time . protection of other growth . right-of-way privileges . ..... 2. Types . standing timber . on-the-road . at-the-yard . ..... B. Deeds 1. Title searches 2. Tax status determination 3. ..... II.	I. Local pulpwood buyer . Local lawyers. . Anderson and Smith. Forests and Forestry. pp. 153-5. . Bromley. Pulpwood Production, pp. 39-40. . Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 15. . Filmstrip: Marketing Timber. . ..... II. .....

RESOURCES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Planning the Legal Aspects of Acquisition

BOOKS

Anderson, D. A. and William A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc. 2nd edition, 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: South Carolina Office of Vocational Education in cooperation with the Vocational Education Media Center, 1973.

FILMS AND FILM STRIPS

Colonial Films, Atlanta Georgia. Marketing Timber, Filmstrip.

BULLETINS

TRANSPARENCIES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Establishing Price

OBJECTIVE(S): I. When given the total volume of standing pulpwood and other relevant facts, e.g., terrain, density, etc., the student will be able to estimate within 5% the true value of the pulpwood.

II. .....

UNIT: Buying Standing Timber for Pulpwood
SUB-UNIT: Establishing Price

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. When given the total volume of standing pulpwood and other relevant facts, e.g., terrain, density, etc., the student will be able to determine the value of a given stand of pulpwood. A. The student will be able to list the major criteria which affect the cost of harvesting timber, e.g., terrain, density, distance from market, etc. B. The student will be able to list at least two sources of pulpwood price information. C. The student will be able to list at least two means of establishing a price/cord of standing pulpwood. D. ..... II.	I. Interview a buyer or harvest foreman to determine the effect of terrain, density, market distance, etc., on the value of a tract of pulpwood. . Prepare or obtain a terrain map or aerial photograph of a small tract of pulpwood and determine accessibility and density of the pulpwood. . Prepare a checklist of items to consider in determining the ease or difficulty of harvesting a tract of pulpwood. . ..... II. .....

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Establishing Price

TOPICS	RESOURCES
I. Price setting A. Ease of harvest 1. Terrain 2. Density 3. Distance from market 4. ..... B. Price determination 1. Marketing service reports 2. Bids 3. ..... II.	I. Local pulpwood buyer . Local pulpwood dealer . Local extension forester . Anderson and Smith. Forests and Forestry. pp. 153-156. . Kirkley. Basic Forestry for Vocational Students in South Carolina. Lesson 15 . ..... II. .....

RESOURCES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Establishing Price

BOOKS

Anderson, D. A. and William P. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, Frank E., et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: South Carolina Office of Vocational Education in cooperation with the Vocational Education Media Center, 1973.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities related to the acquisition of pulpwood timber with careers in other areas of pulpwood harvesting.

II. List the ways in which a given career associated with the acquisition of pulpwood timber complements or fails to complement life goals.

III. ....

UNIT: Buying Standing Timber for Pulpwood
SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Compare and contrast career opportunities related to the acquisition of pulpwood timber. A. List the major careers related to the acquisition of pulpwood. B. Classify the careers as to occupational level, i.e., professional technical, service, etc. C. List the major competencies needed for each of these careers. D. List the major activities performed by persons employed in such positions. E. List the educational requirements and sources. F.	I. Interview as many people employed in buying pulpwood timber as is feasible. . Prepare an in-depth report of a position of most interest. . Perform as many of the tasks performed by people employed in the position or positions of most interest as is feasible. . Arrange to spend a day or half-day with a buyer. . Seek occupational work experience as an assistant to a buyer. . If the position involves further schooling, consult your guidance counselor to determine the schools available.

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
I. Career opportunities in acquisition of pulpwood timber. A. Career titles 1. Pulpwood company cruiser 2. Extension agent 3. Pulpwood dealer (producer) 4. Forestry consultant 5. ..... B. Career classification 1. Professional 2. Technical 3. Service 4. ..... C. Competencies needed 1. Knowledge 2. Skills 3. Attitudes 4. ..... D. Major activities E. Educational requirements F.	I. Bromley. Pulpwood Production. Unit A. . Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 1. . Hoover. Handbook of Agricultural Occupations. Chapter XIII. . Local pulpwood buyer and producers . Local guidance counselor . Teacher of agriculture . .....

UNIT: Buying Standing Timber for Pulpwood
SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
II. List the ways in which a given career associated with buying timber for pulpwood complements or fails to complement life goals. A. List the ways in which a given career benefits society. B. List the ways in which a given career might benefit an individual. C. .... III.	II. Prepare a short paper concerning the ways in which a career in this field would complement or fail to complement life goals. . Participate in a class debate of life goals. . Investigate the living conditions of a person employed in the position to which you aspire. . .... III. .....

UNIT: Buying Standing Timber for Pulpwood
SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
II. Career Evaluation A. Life goals B. Benefits to society C. Benefits to the individual D. ...	II. Hoover. Handbook of Agricultural Occupations. Chapter 1. . Local guidance counselor. . .....
III.	III. .....

RESOURCES

UNIT: Buying Standing Timber for Pulpwood

SUB-UNIT: Exploring Careers

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Kirkley, F. E., et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Vocational Education Media Center cooperating with the South Carolina Division of Vocational Education, 1973.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: System Selection

OBJECTIVE(S):

I. The student will be able to analyze a given tract of pulpwood in terms of harvestability.

II. When given a contract for harvesting a given tract of pulpwood the student will be able to interpret the contract.

III. Based on a given set of variables (terrain, type of cut, size tract, etc.), the student will be able to select an appropriate system of harvest.

IV. ....

UNIT: Harvest Planning and Management
SUB-UNIT: System Selection

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Plan the harvesting of a given tract of pulpwood.	
A. Analyze a given tract in terms of its harvestability.	I-A. Visit the tract chosen by the class to be harvested and study the terrain, stand density, tree characteristic, roads vegetative cover, etc.
1. Given a contour map of a given site the student will be able to detect and locate terrain problems on a map.	. Obtain a map or aerial photograph of the tract and study the terrain and tree growth.
2. Given a soils map of a given site the student will be able to list the anticipated equipment use problems.	. Practice locating roads and landing sites by studying the maps.
3. Given a cruise report of a given site the student will be able to detect and locate areas of high and low density on a map.	. Practice differentiating areas which can be harvested under rainy conditions and those which cannot.
4. Given a cruise report and map of the site the student will be able to locate necessary roads.	. Try to use the cruise report of the tract to locate roads and landings - then check results by visiting the site.
5. Given a cruise report and map of the site the student will be able to locate areas of dense vegetation.	. .....
6.	
B. When given a contract for cutting a tract of timber the student will be able to interpret the terms of the contract.	B. Obtain a contract (perhaps the one used in the unit on buying) and compare interpretations by class members.
1. Interpret marking provided by the cruiser if selective cutting is to be the method of harvest.	. Obtain a copy of a contract being used by a local pulpwood dealer and discuss interpretations.
2. Select trees for selective cutting if marking has not been provided.	. .....
3. Identify boundaries.	
4. Interpret tree size and species according to the contract.	

UNIT: Harvest Planning and Management

SUB-UNIT: System Selection

TOPICS	RESOURCES
A. Harvestability of a site 1. Terrain 2. Contour 3. Soil type 4. Stand density 5. Roads 6.	I. Bromley. Pulpwood Production. Unit F. . Local pulpwood dealers . .....
B. Contract interpretation 1. Determine boundaries 2. Size trees to be cut 3. Identification of tree markings 4. Tree selection 5.	B. Local pulpwood dealers . .....

UNIT: Harvest Planning and Management
SUB-UNIT: System Selection

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: C. Select an appropriate harvesting system for a given site and contract, e.g., clear cutting, selective,etc. 1. Compare and contrast different harvesting system a. List the advantages and disadvantages of a shortwood stump-to-stump system for a given set of conditions. b. List the advantages and disadvantages of a partially mechanized shortwood system. c. List the advantages and disadvantages of a fully mechanized shortwood system. d. List the advantages and disadvantages of a typical partially mechanized longwood system. e. List the advantages and disadvantages of a typical, fully mechanized longwood system. f. Compare and contrast longwood and shortwood systems. g. ..... 2. ..... D.	C. As a class project plan the harvest of a tract of pulpwood. . Observe as many different systems of harvest as possible in the local area. . Select a system of harvest for the class project tract for a fictitious contract which calls for clear cutting. . .....

UNIT: Harvest Planning and Management

SUB-UNIT: System Selection

TOPICS	RESOURCES
C. System Selection 1. Harvest system comparison a. Shortwood 1. Non-mechanized (stump-to-stump) 2. Partially mechanized (prehauling) 3. Fully mechanized . Busch combine . Omark harvester . ..... b. Longwood 1. Partially mechanized 2. Fully mechanized . L. R. A. . Log-All (feller-skidder) . Arbomatib (roadside processor) . Beloit system . Harvester . Beloit chokerless skidder . Truck mounted heel boom loader c. ..... 2.	C. Bromley. Pulpwood Production. Unit E. . Local pulpwood dealers . .....

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: System Selection

BOOKS	FILMS AND FILM STRIPS
Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.	
BULLETINS	TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

OBJECTIVE(S):

I. Given a set of variables (terrain, type timber, time, etc.), the student will be able to select the felling equipment or machinery needed for a given harvest operation.

II. Given a set of variables, the student will be able to select the limbing and bucking equipment needed for a given harvest operation.

III. Given a set of variables, the student will be able to select the skidding and/or prehauling equipment needed for a given operation.

IV. Given a set of variables, the student will be able to select the loading equipment needed for a given harvest operation.

V. Given a set of variables, the student will be able to select the hauling equipment needed for a given harvest operation.

VI. ....

UNIT: Harvest Planning and Management
SUB-UNIT: Machinery and Equipment Selection

OBJECTIVES	LEARNING ACTIVITIES
I. Given a set of variables (harvest system, terrain, volume, labor supply, etc.) the student will be able to select the type, size and amount of machinery and equipment needed for a given harvest operation.	I. As a class project or in small groups, select the machinery needed for a typical or actual harvesting operation in the local community and select the equipment needed. . Prepare a picture display of machinery used in typical harvesting operations in the local community. . ....
A. Given a set of variables, the student will be able to select the felling equipment needed for a given harvest system.	A. Invite a local machinery dealer to discuss felling equipment with the class. . Invite local pulpwood harvesters to discuss felling equipment with the class. . While visiting local harvesting operations, observe the type(s) of felling equipment being used. . Obtain brochures or other literature from manufacturers of felling equipment. . Prepare a check list of variables to consider in comparing different types of felling equipment.
1. The student will be able to list the major variables involved in selecting felling equipment.	
2. The student will be able to list and compare the more commonly used felling equipment as to their cost (fixed and variable), rate of production (in a given condition) and labor requirements.	
a. The student will be able to compare and contrast shears.	. Invite local machinery dealers to demonstrate chain saws, shears,or other felling equipment.
b. The student will be able to compare the bow blade chain saw with the straight blade chain saw.	. ....
c.	
B.	B. .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

TOPICS	RESOURCES
I. Machinery and equipment selection	I-A. Bromley. Pulpwood Production. Unit J. . Local equipment dealers. . Manufacturer's brochures. . Local pulpwood producers. . Omark Industries. All About Chain Saws. . ....
A. Felling equipment 1. Variables involved . Costs . Production rate . Labor requirements . ... 2. Types of equipment . Chain saws . Bow blade . Straight blade . Direct drive . Indirect drive . Shears	
B.	B. .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

OBJECTIVES	LEARNING ACTIVITIES
II. Given a set of variables, the student will be able to select the limbing and bucking equipment needed for a given harvest operation. A. The student will be able to list the major variables involved in selecting limbing and bucking equipment. B. The student will be able to list and compare the more commonly used limbing and bucking equipment as to costs (fixed & variable), rate of production (under given use conditions) and labor requirements. 1. The student will be able to compare and contrast straight vs bow blade chain saws for limbing and bucking. 2. The student will be able to compare and contrast direct vs indirect drive chain saws for limbing and bucking. 3. .... C.	II. Invite local machinery dealers to demonstrate chain saws. . Obtain and file manufacturer's brochures or other literature concerning limbing and bucking equipment. . Invite a pulpwood harvester to discuss his recommendations concerning limbing and bucking equipment based on his experiences. . While visiting a local harvesting operation, observe the types of limbing and bucking equipment being used. . As a class project compare the efficiency of the three or four major types of chain saws for limbing and bucking. . Use the major types of chain saws and make your own comparison. . ....
III. When given a set of variables, the student will be able to select the skidding and/or prehauling equipment needed for a given operation. A. The student will be able to list the major variables involved in selecting skidding and/or prehauling equipment.	III. Invite local machinery dealers to demonstrate skidders and/or prehaulers. . Obtain brochures and other literature from manufacturers. . While visiting local harvesting operations observe the use of skidders and prehaulers. . Prepare a checklist of variables to consider in selecting skidders or prehaulers and use this check list to summarize comparisons.

UNIT: Harvest Planning and Management
SUB-UNIT: Machinery and Equipment Selection

TOPICS	RESOURCES
II. Limbing and bucking equipment	II. Bromley. Pulpwood Production. Unit J. . Local equipment dealers. . Manufacturer's brochures. . Local pulpwood producers. . ....
A. Variables involved . Production rate . Costs . Labor requirements	
B. Types of equipment . Chain saws . Bow blade . Straight blade . Direct drive . Indirect drive . Axes	B. .....
C.	C. .....
III. Skidding and prehauling equipment	III. Bromley. Pulpwood Production. Unit K. . Local equipment dealers. . Manufacturer's brochures. . Local pulpwood producers. . Local skidder or prehauler operators. . ....
A. Variables involved . Production rate . Costs . Labor requirements	

UNIT: Harvest Planning and Management
SUB-UNIT: Machinery and Equipment Selection

OBJECTIVES	LEARNING ACTIVITIES
B. The student will be able to list and compare the more commonly used skidding and prehauling equipment as to costs (fixed and variable) rate of production (under given use conditions) and labor requirements (type and amount). 1. The student will be able to compare and contrast prehaulers with tires vs those with tracks for a given operation. a. List two advantages and two disadvantages of tires. b. List two advantages and two disadvantages of tracks. c. ..... 2. The student will be able to compare and contrast the prehauler vs the skidder for a given harvest operation. a. List at least two advantages and disadvantages of the skidder. b. List at least two advantages and disadvantages of the prehauler. c. ..... 3.	. Ask skidder and prehauler operators to evaluate the types they have used. . Observe demonstrations of and/or operate different skidders and prehaulers-(the forestry field day may provide such an opportunity). . .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

TOPICS	RESOURCES
B. Types of equipment . Skidders . Wheel vs track . Diesel vs gas . ... Prehauler . Lift vs trailer . Wheel vs track . Diesel vs gas . ... C. ..... 3.	3. .....

UNIT: Harvest Planning and Management
SUB-UNIT: Machinery and Equipment Selection

OBJECTIVES	LEARNING ACTIVITIES
IV. When given a set of variables, the student will be able to select the loading equipment needed for a given harvesting operation. A. The student will be able to list the major variables involved in selecting loading equipment. B. The student will be able to list and compare the more commonly used loading equipment as to costs (fixed and variable), rate of production (under given loading conditions) and labor requirements (type and amount). 1. The student will be able to list at least two advantages and disadvantages of the pallet system. 2. The student will be able to list at least two advantages and disadvantages of the "Big-Stick" loader. 3. The student will be able to list at least two advantages and disadvantages of the crane loader. 4. The student will be able to list at least two advantages and disadvantages of the front-end fork loader. 5. The student will be able to list at least two advantages and disadvantages of hydraulic loading (knuckle-boom or heel-boom). 6.	IV. Invite local dealers to demonstrate loading equipment. . Obtain brochures or other literature from manufacturers of loading equipment. . While visiting local harvesting operators, observe the loaders being used. . Prepare a checklist of variables to consider in selecting loaders and use the checklist to summarize comparisons. . Ask loader operators or pulpwood producers to compare types of loaders. . Observe demonstrations of and/or operate loaders (the forestry field day may provide an opportunity for this). . Operate the scale-model knuckle-boom loader available to forestry classes in South Carolina. . .....

UNIT: Harvest Planning and Management
SUB-UNIT: Machinery and Equipment Selection

TOPICS	RESOURCES
IV. Loading equipment A. Variables involved . Production rate . Costs . Fixed . Variable . ... Labor requirements . ..... B. Types of Loaders . Front-end fork-lift type . Crane . Hydraulic . Knuckle-boom . Heel-boom . ..... C.	IV. Bromley. Pulpwood Production. Unit M. . Local equipment dealers . Manufacturer's brochures . Local pulpwood producers . Local loader operators . .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

OBJECTIVES	LEARNING ACTIVITIES
V. When given a set of variables, the student will be able to select the hauling equipment needed for a given harvesting operation.	V. A-B. While visiting local harvesting operations, observe the types of hauling equipment being used.
A. The student will be able to list the major variables involved in selecting hauling equipment.	. Invite local harvesters to discuss their experiences with various types of hauling equipment.
B. The student will be able to list and compare the more commonly used hauling equipment as to costs (fixed and variable), rate of production (under given hauling conditions) and labor requirements.	. Prepare a checklist of variables to consider in selecting hauling equipment and use this checklist to summarize comparisons.
1. The student will be able to list at least two advantages and disadvantages of a single axle, short body trucks ("Bobtail" trucks).	. Ask to ride with a truck driver on a typical haul.
2. The student will be able to list at least two advantages and disadvantages of the "false" tandem-axle truck and the tandem-axle truck.	. Invite local truck and trailer dealers to demonstrate their equipment.
3. The student will be able to list at least two advantages and disadvantages of a truck and trailer for hauling pulpwood.	. Obtain brochures and other literature from manufacturers.
4. The student will be able to compare and contrast diesel vs gasoline powered trucks for a given haul situation.	. Compare the load capacity of various trucks.
5.	. .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machnery and Equipment Selection

TOPICS	RESOURCES
V. Hauling equipment selection 1. Variable involved . Production rate . Costs . Fixed . Variable . Labor requirements . ..... 2. Types of hauling equipment . Trucks . Short "Bobtail" . Single axle . "False" tandem . Tandem axle . Diesel-gas . Truck and trailer rigs . Semi-trailer . Tandem-axle . Diesel-gas	V. Bromley. Pulpwood Production. Unit N. . Local truck dealers . Manufacturer's brochures . Local pulpwood producers . Local pulpwood truck drivers . .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

OBJECTIVES	LEARNING ACTIVITIES
C. The student will be able to select special truck accessories needed.	C. Make a list of the special accessories observed on hauling equipment, e.g., tires, brakes, etc.
1. Compare and contrast spring capacity needed for differing local and hauling conditions.	. Ask local truck dealers to discuss special accessories.
2. Compare and contrast tire types for various hauling conditions.	. Ask local pulpwood producers to discuss the need for special accessories.
3. Compare and contrast brake types and capacities needed for various hauling conditions.	. Ask local pulpwood truck drivers to discuss the need for special accessories.
4. Compare and contrast types and sizes of trailers needed for various hauling conditions.	. .....
5.	
D.	D. .....
VI.	VI. .....

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

TOPICS	RESOURCES
. Truck accessories . Special brakes . Special tires . Springs	
D.	D. .....
VI.	VI. .....

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

FILMS AND FILM STRIPS

BULLETINS

Omark Industries, Oregon Saw Chain Division. All About Chain Saws.

TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: Operational Planning

OBJECTIVE(S): I. Given a cruise report and the system of harvest to be used the student will prepare and operational flow chart of the total harvest and hauling operation.

II. ....

UNIT: Harvest Planning and Management
SUB-UNIT: Operational Planning

OBJECTIVES	LEARNING ACTIVITIES
I. Given a site analysis and the system of harvest to be used the student will prepare an operational flow chart of the total harvest and hauling operation.	I. As a class project or in small groups, prepare a flow chart of a harvest system(s).
A. Given the system of harvest and a cruise report the student will be able to chart the sequence and estimate the man hours required for each of the major operations involved, i.e., felling, skidding, loading, hauling, etc.	. Prepare a flow chart of the cutting operation. . Prepare a flow chart of the skidding operation. . Prepare a flow chart of the loading operation. . Prepare a flow chart of the hauling operation. . ....
B. Given the system of harvest and a cruise report the student will be able to estimate (within one cord) the total daily harvest.	. Visit a harvesting operation in the local area as a class or individually and time the various operations, i.e., cutting, skidding, loading, hauling, etc.
C. Given the system of harvest and a cruise report the student will be able to determine the type of labor required for harvesting a given site.	. Briefly interview workers involved in various harvesting operations to determine the amount of time required to master their jobs.

UNIT: Harvest Planning and Management
SUB-UNIT: Operational Planning

TOPICS	RESOURCES
I. Operational Planning A. Charting . Felling operations . Operational sequence . Time consumed . ... . Skidding operations . Operational sequence . Time consumed . ... . Loading operations . Operational sequence . Time consumed . ... . Hauling operations . Operational sequence . Time consumed . ... B. Determining daily production C. Determining labor needs.	I. Bromley. Pulpwood Production. Unit F., also see pp. 213 - 218. . Local pulpwood harvesters. . Local Foresters. . .....

UNIT: Harvest Planning and Management
SUB-UNIT: Operational Planning

OBJECTIVES	LEARNING ACTIVITIES
D. Given the system of harvest to be used and a cruise report the student will be able to prepare a hauling schedule.	. While visiting the harvesting operation, observe the type of hauling, i.e., type roads, distance, loading system, timing amount of load, etc.
E. Given the system of harvest to be used, the hourly volume of wood and the distance to market the student will be able to select the type(s) of trucks required.	. ....
F.	

UNIT: Harvest Planning and Management
SUB-UNIT: Operational Planning

TOPICS	RESOURCES
D. Preparing a haul schedule	
E. Selecting type of truck for a given harvest operation	
F.	

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Operational Planning

BOOKS	FILMS AND FILM STRIPS
Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.	
BULLETINS	**TRANSPARENCIES**

UNIT: Harvest Planning and Management

SUB-UNIT: Cost Analysis

OBJECTIVE(S): I. The student will be able to analyze a given pulpwood harvesting operation or facet of the operation and determine profit or loss.

II. ....

UNIT: Harvest Planning and Management
SUB-UNIT: Cost Analysis

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Analyze a given harvest operation or part of such an operation and determine profits or losses. A. Determine the gross income from pulpwood sold for a typical year. B. Determine total expenses for a typical year. 1. Determine stumpage cost for a typical year. 2. Determine machinery and equipment costs for a typical year. (a) Determine the fixed cost of a given piece of machinery. (1) Determine interest on a given machine. (2) When given initial cost, average life and salvage price, determine the depreciation cost on a given machine. (3) Determine insurance rate on a given machine. (4) Determine tax and license cost on a given machine. (5) ... (b) Determine the variable cost of a given machine for a typical year. (1) Determine the fuel cost of operating a given machine. (2) Determine the maintenance and repair cost of operating a given machine. (3)	I. As a class project, do an estimated cost analysis of a local pulpwood harvesting operation. . Ask a local dealer (producer) to furnish the class with an earnings report - perhaps not the actual as producers man be sensitive about revealing earnings. . As an individual or member of a committee, investigate the fixed and variable cost of a given machine and report your results to the class. . As an individual or member of a team, investigate the stun page costs of an operation. . Practice solving depreciation or interest problems. . As an individual or member of a committee, investigate the variable costs of operating a given machine and report your results to the class. . ....

UNIT: Harvest Planning and Management
SUB-UNIT: Cost Analysis

TOPICS	RESOURCES
I. Cost Analysis A. Gross income B. Expenses 1. Stumpage costs 2. Machinery costs . Fixed . Interest . Depreciation . Insurance . Misc. . Variable . Fuel . Repair and maintenance	I. Bromley. Pulpwood Production. pp. 218-224. . Local pulpwood dealers (producers) . Local accountant . ...

UNIT: Harvest Planning and Management
SUB-UNIT: Cost Analysis

OBJECTIVES	LEARNING ACTIVITIES
C. Determine labor cost for a given operation on a yearly basis.	
1. Calculate labor costs for a given operation or part of an operation.	C-1. As an individual or member of a committee, investigate in detail the labor cost of a certain operation; e.g., investigate the labor cost per cord of the hauling operation. This might involve on site observation. Other committees might be making similar observations of other operations, e.g., loading or skidding.
a. Calculate per cord labor costs involved in felling, limbing, and bucking, using a given system with typical production. b. Calculate per cord labor costs involved in skidding or prehauling using a given system with typical production. c. Calculate labor costs involved in loading using a given system with typical production. d. Calculate labor costs involved in hauling with a given system and with typical production. e. ...	. Use a yearly earnings report to calculate per cord labor cost by determining the number of men employed in each facet of the operation, their wages, and the total production. . ...
2. Determine payroll taxes and insurance for a given pulpwood operation for a typical year.	C-2. Invite an accountant to discuss payroll taxes and insurance costs for a typical pulpwood operation.
a. Calculate the social security tax due on a given employee on a yearly basis. b. Calculate the unemployment tax for a given employee on a yearly basis. c. Calculate workmen's compensation insurance cost on a given employee for a year. d. ...	. Practice calculating social security payments for employees. . Prepare a chart which lists all payroll deductions and shows calculation formulas. . ...
II. ...	II. ...

UNIT: Harvest Planning and Management
SUB-UNIT: Cost Analysis

TOPICS	RESOURCES
C. Total Labor Costs	C-1. Bromley. Pulpwood Production. Unit O.
1. Labor cost by facet of operation	. Local pulpwood dealers (producers)
a. Felling, limbing and bucking b. Skidding and prehauling c. Loading d. Hauling e. ...	. ...
2. Payroll taxes and insurance	C-2. Bromley. Pulpwood Production. pp. 218-224.
a. Social Security b. Unemployment Insurance c. Workmen's Compensation Tax d. ...	. Local pulpwood dealers (producers) . Local accountant . ...
II. ...	II. ...

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Cost Analysis

BOOKS	FILMS AND FILM STRIPS
Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.	
BULLETINS	**TRANSPARENCIES**

UNIT: Harvest Planning and Management

SUB-UNIT: Records and Insurance

OBJECTIVE(S): The student will be able to:

I. Plan a record keeping system for a given pulpwood harvesting business.

II. Plan an insurance protection program for a given pulpwood harvesting operation.

III. ....

UNIT: Harvest Planning and Management
SUB-UNIT: Records and Insurance

OBJECTIVES	LEARNING ACTIVITIES
I. Plan a record keeping system for a given pulpwood harvesting business.	I. As a class or small group project plan a record keeping system for a typical harvesting business. . Invite the bookkeeper for a local operator to discuss his system with the class.
A. Plan a record keeping system for revealing operating efficiency.	A. As a class or small group project devise a record keeping system which will reveal profits and/or losses for the total operation or significant smaller operations.
1. Plan a labor efficiency report.	. Prepare a set of fictitious expenses and receipts for a period of time (perhaps a quarter) and enter such data in a record book.
2. Plan a machinery efficiency report.	. Invite a teacher of bookkeeping to serve as a resource person in planning the bookkeeping system.
3.	. Invite a local dealer to discuss record used to reveal operating efficiency. . ....
B. Plan a record keeping system for facilitating government records.	B. As a class project or in small groups, plan a record keeping system for facilitating government records.
1. List the required payroll deductions of a typical employee, e.g., income tax, social security, unemployment insurance, etc.	. Prepare a check list of records needed for a typical employee, e.g., total wages, age, family size, days worked, etc.
2. List the information needed to determine the income tax deductions for a typical employee.	. Prepare a checklist of payroll deductions for a typical employee, e.g., Federal income tax, social security, workmen's compensation, unemployment insurance, etc.
3. List the information needed to determine the social security deductions for a typical employee.	. Prepare a social security deduction for a typical employee.
4.	

UNIT: Harvest Planning and Management

SUB-UNIT: Records and Insurance

TOPICS	RESOURCES
I. Record keeping system	I. Bromley. Pulpwood Production. Unit P.
	. Local high school business teacher.
	. Local pulpwood producers.
	. ....
A. Records for operational efficiency	
. Labor production	
. Machinery production	
. ...	
B. Records required for government reports for employees	
. Income tax	
. State	
. Federal	
. ...	
. Social Security	
. Unemployment insurance	
. ...	

UNIT: Harvest Planning and Management
SUB-UNIT: Records and Insurance

OBJECTIVES	LEARNING ACTIVITIES
C. List the records needed for preparing federal income tax on the business.	C. Prepare an income tax deduction for a typical employee.
1. List the major deductable items, e.g., losses, gasoline or diesel fuel, Federal Excise Tax on tires, trucks and accessories, Federal Highway use Tax or vehicle license, etc.	. Prepare a checklist of deductable tax items for a typical pulpwood harvesting operation.
2.	. ....
D.	D. ....
II. Plan an insurance protection program for a given pulpwood harvesting business.	II. Prepare a checklist of insurances need by a typical pulpwood harvesting business.
A. List a least three reasons for having public liability insurance.	. Invite a local insurance agent to discuss insurances needed by a pulpwood dealer.
B. List at least three reasons for having motor vehicle insurance.	. Invite a local pulpwood dealer to discuss insurance needed for his business.
C. List at least three reasons for having loss insurance such as wind, hail, robbery, etc.	. ....

UNIT: Harvest Planning and Management
SUB-UNIT: Records and Insurance

TOPICS	RESOURCES
C. Business records for taxes . Cost and receipt records . Inventory records . Depreciation records . Deductable items . Gasoline or fuel tax . Truck and tire excise tax . Vehicle license or road tax D. ...	D. ...
II. Insurance A. Public liability B. Motor vehicle C. Property loss . Caused by nature . Wind . Hail . Flood . ... . Intentional acts of man . Vandalism . Attempted theft . ... . Criminal acts . Burglary . Robbery . Forgery	II. Bromley. <u>Pulpwood Production</u>. Unit P. . Local pulpwood producers. . Local Insurance salesmen. . ....

UNIT: Harvest Planning and Management
SUB-UNIT: Records and Insurance

OBJECTIVES	LEARNING ACTIVITIES
D. List at least three reasons for having workmen's compensation on all employees. E. .... III.	

UNIT: Harvest Planning and Management
SUB-UNIT: Records and Insurance

TOPICS	RESOURCES
. Embezzlement . ... . Fire D. Workmen's compensation E. .... III.	

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Records and Insurance

BOOKS	FILMS AND FILM STRIPS
Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.	
BULLETINS	TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in harvest planning and management with other careers in forestry.

II. List the ways in which a given career in harvest planning and management might complement or fail to complement life goals.

III. .....

UNIT: Harvest Planning and Management
SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Compare and contrast career opportunities in harvest planning and management with those of other careers in forestry. A. List the major job titles related to harvest planning. B. Classify the careers as to occupational level, i.e., professional, technical, service, etc. C. List the major competencies needed for a career in pulpwood harvest planning and management. D. List the major activities performed by persons employed in pulpwood harvest planning and management. E. List the educational requirements and sources for training in pulpwood harvest planning and management. F.	I. Interview as many people employed in harvest planning and management as is feasible. . Prepare an in-depth report of a position in harvest planning and management. . Perform as many of the tasks performed by people employed in harvest planning and management as is feasible. . Arrange to spend a day or half a day with a person employed in harvest planning and management. . Seek occupational work experience as an assistant to a person employed in this field. . Investigate, with the aid of your guidance counselor, possibilities for additional training in this field. . .....

UNIT: Harvest Planning and Management
SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
I. Career Opportunities A. Career titles 1. Pulpwood (dealer or producer) 2. ..... B. Career classification 1. Professional 2. Technical 3. Service 4. ..... C. Competencies needed 1. Knowledge 2. Skills 3. Attitudes 4. ..... D. Major activities E. Educational requirements F.	I. Bromley. Pulpwood Production. Unit A. . Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 1. . Hoover. Handbook of Agricultural Occupations. Chapter XIII. . Local pulpwood dealers (producers) . .....

UNIT: Harvest Planning and Management

SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
II. List the ways in which a given career in harvest planning and management might complement or fail to complement life goals. A. List at least five ways in which a given career in harvest planning and management benefits society. B. List at least five ways in which a given career in harvest planning and management might benefit an individual. C. ..... III.	II. Prepare a short paper concerning the ways in which a career in harvest planning and management might complement or fail to complement life goals. . Participate in a class debate of life goals. . Investigate the living conditions of a person employed in harvest planning and management. . ..... III. .....

UNIT: Harvest Planning and Management
SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
II. Career evaluation A. Life goals B. Benefits to society C. Benefits to the individual D. ..... III.	II. Hoover. Handbook of Agricultural Occupations. Chapter 1. . Local school guidance counselor . ..... III. .....

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Exploring Careers

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois. The Interstate Printers and Publishers, Inc., 2nd edition,1969.

Kirkley, F. E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, South Carolina: Vocational Education Media Center in cooperation with South Carolina Division of Vocational Education, 1973.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Harvesting

SUB-UNIT: Felling, Limbing and Bucking

OBJECTIVE(S): The student will be able to:

I. Fell a given tree and achieve the desired direction of fall using a chain saw.

II. Fell a given tree and achieve the desired direction of fall using hydraulic shears.

III. Limb, mark and buck a given tree.

IV. ....

UNIT: Harvesting Pulpwood
SUB-UNIT: Felling, Limbing and Bucking

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Plan the felling, limbing, and bucking of trees using a given method. A. Fell a given tree and achieve the desired direction of fall using a given type chain saw. 1. Given terrain, wind, and vegetation information select the most appropriate landing site for a given tree. 2. Identify the natural fall direction of a given tree. 3. Notch a tree to achieve a desired fall using a chain saw and axe. 4. Prepare a trunk cut using a chain saw. 5. Determine the need for wedging. a. Select an appropriate wedge for a given situation. b. Install a wedge. c. List at least 5 factors which determine the need for wedging. 6. List at least 5 safety hazards involved in felling a tree. 7. .... B.	I. As a class project harvest a small plot of pulpwood using a chain saw. . Observe demonstration(s) and/or demonstrate safe tree felling. . Diagram an appropriate notch and cut. . Observe demonstrations of and/or practice felling trees to achieve a desired direction of fall when special condition exist, e.g. wind is blowing in the opposite direction, the tree is crooked and leans in a different direction, etc. . Observe demonstrations of the safe operation of the chain saw. . Observe demonstrations of and or practice carrying a chain saw from tree to tree in a safe manner. . Observe demonstrations of wedging and practice wedging. . Visit a harvesting operation and observe experienced workers as they fell trees. . ....
II. Fell a given tree using hydraulic shears.	II. Observe demonstrations of the use of hydraulic shears for felling. . ....

UNIT: Harvesting Pulpwood

SUB-UNIT: Felling, Limbing and Bucking

TOPICS	RESOURCES
I. Felling, limbing and bucking	I. Bromley. Pulpwood Production. Unit J.
A. Felling by chain saw	. Local pulpwood producers
. Selecting landing site	. Omark Industries. All About Using Chain Saws.
. Brush clearing	. ....
. Lean assessment	
. Notching	
. Trunk cut	
. Wedging	
. Safety	
. .....	
B.	
II. Felling by hydraulic shears	II. Bromley. Pulpwood Production. Unit J. pp. 144-6.

UNIT: Harvesting Pulpwood

SUB-UNIT: Felling, Limbing and Bucking

OBJECTIVES	LEARNING ACTIVITIES
III. Safely limb, mark and buck a given tree. A. Diagram the sequence for limbing, i.e., butt to top, etc. B. Determine the total length to be limbed. C. Measure and mark the tree for subdivision into proper lengths. D. Buck the felled tree into length specified by the dealer. E. Diagram the appropriate sequence for bucking. F. List at least 6 safety hazards involved in limbing and bucking. G. Select an appropriate axe for limbing. H. .... IV.	III. Observe demonstrations of and/or limb and buck trees using a chain saw and/or axe. . Observe special demonstrations of safety hazards involved in limbing and bucking, e.g., binding, spring effect of bent trees, etc. . Observe demonstrations of the safe and efficient use of an axe in limbing. . Visit a harvesting operation and observe the limbing and bucking operations. . .... IV. ....

UNIT: Harvesting Pulpwood

SUB-UNIT: Felling, Limbing and Bucking

TOPICS	RESOURCES
III. Limbing, marking and bucking A. Limbing . Sequence . Length determination B. Marking C. Bucking . Sequence . ... D. Safety E. ...	III. Bromley. Pulpwood Production. Unit J. . Local pulpwood producers . Omark Industries. All About Using Chain Saws. . ....
IV.	IV. ....

RESOURCES

UNIT: Pulpwood Harvesting

SUB-UNIT: Felling, Limbing and Bucking

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

FILMS AND FILM STRIPS

BULLETINS

Omark Industries. Oregon Saw Chain Division. All About Using Chain Saws

TRANSPARENCIES

UNIT: Harvesting

SUB-UNIT: Skidding and Prehauling

OBJECTIVE(S): The student will be able to:

I. Skid or prehaul felled pulpwood from the stump to a landing.

A. Load and operate a wheel type skidder to move long bolt pulpwood from the stump to the landing.

B. Load and operate a wheel type prehauler to transport short type pulpwood from the stump to the landing.

C. Rig a choker system for a given skidder operation.

D. .....

II. .....

UNIT: Harvesting
SUB-UNIT: Skidding and Prehauling

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Skid or prehaul felled pulpwood from the stump to a landing.	I. As a class project or demonstration practice using skidders and/or prehaulers to move pulpwood from the stump to the landing.
A. Load and operate a wheel-type skidder to move long bolt pulpwood from the stump to the landing.	A. Observe demonstrations of and/or attach choker cables to long bolt pulpwood for moving from stump to landing.
1. Attach choke cable.	. Observe demonstrations of and/or operate a wheel skidder to transport long bolt pulpwood from the stump to the landing.
2. Operate a skidder winch.	. Observe safety demonstrations designed to show safety hazards.
3. Operate a wheel-type skidder.	. Visit a harvesting operation and observe skidding.
4. List at least five safety factors involved in using a wheel-type skidder.	. .....
5.	
B. Load and operate a wheeled prehauler to move short bolt pulpwood from the stump to the landing.	B. Observe demonstrations of and/or load a typical wheel-type prehauler using a winch cable.
1. Load a typical wheeled prehauler.	. Observe demonstrations of and/or operate a typical wheel-type prehauler.
2. Operate a typical wheeled prehauler.	. Visit a harvesting operation and observe prehauling.
3.	. .....

UNIT: Harvesting

SUB-UNIT: Skidding and Prehauling

TOPICS	RESOURCES
I. Skidding and Prehauling	I. Bromley. Pulpwood Production. Unit K.
A. Skidder loading and operation.	. Local pulpwood producers
1. Attaching choker cables.	. .....
2. Operating skidder winch.	
3. Skidder operation.	
4. Safety.	
B. Loading and operating prehaulers.	B. Bromley. Pulpwood Production. Unit K.
1. Loading systems	. Local pulpwood producers
. Pallet . Grapple	. .....
2. Operation	
3. Safety	
4.	

UNIT: Harvesting

SUB-UNIT: Skidding and Prehauling

OBJECTIVES	LEARNING ACTIVITIES
C. Rig a choker system for given skidder and winch. 1. Diagram a typical choker system. 2. List at least two types of cables. 3. Demonstrate the "rule of thumb" for winding cables over a winch drum. 4. List at least five safety hazards involved in using winches and cables. 5. ..... D. ..... II.	C. Observe demonstrations of and/or attach chokers for winching. . Observe demonstrations of and/or operate a typical winch. . Observe demonstrations of and/or conduct simulations of the "rule of thumb" for winding cables on a drum. . Observe winch safety demonstrations. . ..... D. ..... II. .....

UNIT: Harvesting

SUB-UNIT: Skidding and Prehauling

TOPICS	RESOURCES
C. Rigging a choker system.	C. Bromley. Pulpwood Production. Unit L.
1. Cable types	. Local pulpwood producers
2. Chokers	. .....
3. Winding cables	
4. Safety	
5.	
D.	D. .....
II.	II. .....

RESOURCES

UNIT: Harvesting

SUB-UNIT: Skidding and Prehauling

BOOKS	FILMS AND FILM STRIPS
Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers Inc., 2nd edition, 1969.	
BULLETINS	TRANSPARENCIES

UNIT: Harvesting

SUB-UNIT: Loading and Hauling

OBJECTIVE(S): The student will be able to:

I. Load a given type of pulpwood using a given method and loading equipment.

A. Load short stick pulpwood using a front-end or fork-lift type loader.

B. Load short or long stick pulpwood using a knuckle-boom type loader.

C. Load a given truck using the pallet system with a winch or "Big-Stick".

D. Arrange a load such that proper weight and balance are achieved.

E. Transport pulpwood from a given loading area to a given market via a given truck.

F. .....

II. .....

UNIT: Harvesting

SUB-UNIT: Loading and Hauling

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Load a given type of pulpwood using a given method and loading equipment. A. Load short stick pulpwood using a front-end lift type loader. 1. Given typical choker cables used on such loaders the student will be able to attach and release such chokers. 2. Given a typical front-end loader the student will be able to operate both the lift controls and the vehicle itself. 3. List 5 safety hazards involved in the use of this machine. 4. Perform daily maintenance on the loader. 5. ..... B. Load short or long bolt pulpwood using a knuckle-boom loader. 1. Given a typical knuckle-boom loader, the student will be able to safely operate the vehicle. a. Identify all controls. b. Perform at least six basic maneuvers.	I. Observe demonstrations of and/or practice loading pulpwood using different methods and loading equipment. . Visit local harvesting operations and observe different methods of loading. A. Observe demonstrations of and/or practice loading short stick pulpwood using the front-end lift type loader. . Observe demonstrations of the safety hazards involved in the use of such equipment. . Observe demonstrations of and/or perform daily maintenance on such equipment. . Visit a harvesting operation where such equipment is being used and observe its use. . ..... B. Observe demonstrations of and/or practice using a typical knuckle-boom loader for loading both long and short stick pulpwood. . Observe safety demonstrations. . Observe demonstrations of and/or perform daily maintenance on a typical knuckle-boom loader. . Practice control exercises used in the Knuckle-boom Loader Manual. . Practice using the knuckle-boom loader simulator. . .....

UNIT: Harvesting
SUB-UNIT: Loading and Hauling

TOPICS	RESOURCES
I. Loading	I. Bromley. Pulpwoood Production. Unit M.
A. Using the front-end or fork-lift loader.	. Owners manuals.
1. Choker attachment and release	. Local loader operators.
2. Lift controls	. .....
3. Vehicle controls	
4. Safety hazards	
5. Daily maintenance	
6.	
B. Using the knuckle-boom loader.	B. Bromley. Pulpwood Production. Unit M.
1. Vehicle	. Manufacturer s or operator's manuals.
. Control identification . Daily maintenance . Safety hazards	. Local loader operators.
. .....	. .....

UNIT: Harvesting

SUB-UNIT: Loading and Hauling

OBJECTIVES	LEARNING ACTIVITIES
c. List at least 5 safety hazards. d. ... 2. Given a typical knuckle-boom loader, the student will be able to operate the grapple controls. a. Identify all controls b. Perform at least six basic maneuvers. c. List at least 5 safety hazards involved in using the grapple. d. Perform daily maintenance procedures on the grapple. e. .... 3. When given long bolt pulpwood to be loaded the student will be able to select the point on the log to attach the grapple. 4. When given more than one log to lift in one carry the student will be able to select a maximum load. 5.	
C. Load a short truck or trailer truck using the pallet and/or "Big-Stick" system. 1. Given a typical pallet and winch system operate the winch and/or winch and boom to load short stick pulpwood. 2. The student will be able to list at least 5 safety hazards involved in using a winch and/or "Big-Stick" pallet system. 3. The student will be able to perform daily the maintenance needed on such a system. 4.	C. Observe demonstrations of and/or practice loading a truck using a typical pallet and winch system. . Observe demonstrations of the safety hazards involved in the use of this system. . Observe and/or perform daily maintenance on the equipment used in this system. . ....

UNIT: Harvesting
SUB-UNIT: Loading and Hauling

TOPICS	RESOURCES
2. Grapple . Control identification . Basic maneuvers . Safety hazards . Daily maintenance . ... 3. Grapple placement 4. Grapple load 5. ...	
C. Using the pallet and winch or "Big-Stick" system. 1. Using the winch or winch and boom. . Winch controls . Boom controls . ..... 2. Safety hazards 3. Daily maintenance 4.	C. Bromley. Pulpwood Production. Unit M. . Manufacturer's or operator's manuals . Local loader operators . .....

UNIT: Harvesting
SUB-UNIT: Loading and Hauling

OBJECTIVES	LEARNING ACTIVITIES
D. Arrange a load such that the load has the proper weight balance on each axle. 1. State in writing the maximum weight per axle for a given truck and license. 2. Prepare a diagram showing the shape of ideal load. 3. List at least two safety hazards involved in hauling an improperly loaded truck. 4. List at least four criteria for evaluating a well loaded truck. 5.	D. Observe a demonstration of and/or load a truck to achieve the correct weight balance. . Prepare drawings of properly loaded trucks. . Obtain and file information concerning load restrictions for pulpwood trucks. . ....
E. Transport pulpwood from the loading area to the market via a given truck. 1. Operate a given truck. a. Diagram the gear shift positions. b. Select the proper r.p.m.'s if shifting a given gear. c. .... 2. Estimate weight per axle for a given load. 3. Secure a given load with a chain and binder. 4. Prepare a maintenance checklist. 5. Back a trailer to a desired location.	E. Arrange to ride with a pulpwood truck driver on a typical haul. . If license and experience permit, operate a pulpwood truck on a typical haul. . As a committee or class project prepare a maintenance checklist. . Practice backing a trailer into a given area (could make an excellent contest of skill). . Invite a local highway patrolman to discuss truck regulations with the class. . Invite a local truck driver to discuss driving experiences.

UNIT: Harvesting
SUB-UNIT: Loading and Hauling

TOPICS	RESOURCES
D. Arranging a load on the truck. 1. Weight restrictions per axle 2. Load shape 3. Safety hazards 4. Criteria for evaluating load placement 5.	D. Bromley. Pulpwood Production. Unit N. . South Carolina Department of Motor Vehicles. . Local pulpwood producers. . Local truck operators. . .....
E. Transporting pulpwood 1. Truck operation . Shifting . Position identification . R.P.M. for shifting . Special road regulations . Safety hazards . Special safety equipment . ..... 2. Load specifications 3. Securing a load 4. Backing a trailer 5. Preparing a maintenance checklist 6.	E. Bromley. Pulpwood Production. Unit N. . Local pulpwood truck drivers. . Local pulpwood producers. . Local highway patrolman. . .....

UNIT: Harvesting

SUB-UNIT: Loading and Hauling

OBJECTIVES	LEARNING ACTIVITIES
6. List at least six special highway regulations which apply to truck, but not cars. 7. List at least six safety hazards involved in driving pulpwood trucks. 8. List at least ten special safety features which may be required of pulpwood trucks, e.g., heavy duty braking, special mirrors, special clearance lights,etc. 9. ..... F. ..... II.	. Observe demonstrations of safety hazards involved in the operation of pulpwood trucks. . ..... F. ..... II. .....

UNIT: Harvesting

SUB-UNIT: Loading and Hauling

TOPICS	RESOURCES
F.	F. .....
II.	II. .....

RESOURCES

UNIT: Harvesting

SUB-UNIT: Loading and Hauling

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Harvesting Operations

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in harvesting operations with other careers in forestry.

II. List the ways in which a given career in harvesting operations might complement or fail to complement life goals.

III. .....

UNIT: Harvesting Operations

SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to: I. Compare and contrast career opportunities in harvesting operations with those in other areas of forestry. A. List the major job titles related to harvest planning. B. Classify the careers as to occupational level, i.e., professional, technical, service, etc. C. List the major competencies needed for a career in harvesting operations. D. List the major activities performed by persons employed in pulpwood harvesting operations. E. List the educational requirements and sources of such training. F.	I. Interview as many people employed in harvesting operations as is feasible. . Prepare a detailed report of the job(s) of particular interest. . Practice as many of the task performed by people holding these jobs as is feasible. . Arrange to spend a day or portion of a day with a person employed in harvesting operations. . Seek occupational work experience as harvest operations workers. . Investigate with your teacher of agriculture and/or guidance counselor the possibilities for further training and job opportunities in the area. . .....

UNIT: Harvesting Operations
SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
I. Careers in harvesting operations. A. Career titles 1. Chain saw operator 2. Tree shear operator 3. Limb and bucker 4. Skidder operator 5. Prehauler operator 6. Loader operator . Knuckle-boom loader operator . Fork-lift operator . ..... 7. Truck driver 8. ..... B. Career classification 1. Professional 2. Technical 3. Service 4. ..... C. Competencies needed 1. Knowledge 2. Skills 3. Attitudes 4. ..... D. Major activities E. Educational requirements F.	I. Bromley. Pulpwood Production. Unit A. . Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 1. . Hoover. Handbook of Agricultural Occupations. Chapter XIII. . Local pulpwood producers . Local school guidance counselor . Teacher of agriculture . ....

UNIT: Harvesting Operations

SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
II. List the ways in which a given career in harvesting operations might complement or fail to complement life goals. A. List at least five ways in which a career in harvesting operations might benefit society. B. List at least five ways in which a career in harvesting operations might benefit an individual. C. ..... III.	II. Prepare a short paper concerning the ways in which a career in harvesting operations might complement or fail to complement life goals. . Participate in a class debate of life goals. . Investigate the living conditions and life style of a person employed in harvesting operations. . ..... III. .....

UNIT: Harvesting Operations

SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
II. Career evaluation A. Life goals B. Benefits to society C. Benefits to the individual D. ..... III.	II. Hoover. Handbook of Agricultural Occupations. Chapter 1. . Local school guidance counselor . ..... III. .....

RESOURCES

UNIT: Harvesting Operations

SUB-UNIT: Exploring Careers

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc. 2nd edition, 1969.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Clemson, South Carolina: Vocational Education Media Center in cooperation with South Carolina Division of Vocational Education, 1973.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: General Shop Skills

OBJECTIVE(S): I. The student will be able to demonstrate the ability to perform general shop skills.

II. ....

UNIT: Pulpwood Mechanics
SUB-UNIT: General Shop Skills

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Demonstrate the ability to perform general shop skills.	I. Observe demonstrations of and/or practice the safe and appropriate use of the more commonly used hand wood-working tools.
A. Select and properly use the more commonly used hand wood-working tools, e.g., the handsaw, plane, etc.	. Observe demonstrations of and/or practice the safe and appropriate use of the more commonly used metal-working or mechanics tools.
B. Select and use the more commonly used metal-working or mechanics tools, e.g., wrenches, tap and die sets, etc.	. Observe demonstrations of and/or the selection, adjustment and safe operation of and/or practice the safe and appropriate use of the more commonly used power tools.
C. Select, adjust and operate basic power tools, e.g., power saws, electric drills, etc.	. Observe demonstrations of and practice the safe and appropriate use of electric welder for very simple welding tasks.
D. Weld an acceptable flat bead using an electric welder.	. Observe demonstrations of and practice the safe and appropriate use of the oxyacetylene welder for performing very simple cuts and welds.
E. Perform an acceptable cut and weld a flat bead using an oxyacetylene welder.	. Construct a simple wood-working project.
F.	. Construct a simple metal-working project.
	. .....
II.	II. ....

UNIT: Pulpwood Mechanics
SUB-UNIT: General Shop Skills

TOPICS	RESOURCES
I. Basic shop skills A. Hand tools . Woodworking . Selection . Use . Care . ... B. Metal working . Selection . Use . Care . ... C. Basic power tools . Selection . Adjustment and use . Safety . ... D. Electric welder . Use . Safety	I. Wakeman. The Farm Shop. . Griffin, et al. Basic Oxyacetylene Welding. . O'Brien. Farm Shop Demonstrations. . Film. ABC'S of Hand Tools. . Films, Filmstrip, Transparencies - (Stanley Tool Company offers instructional materials concerning the use of hand tools and power equipment.) . ....
II.	II. ....

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: General Shop Skills

BOOKS

Griffin, Ivan and Roden, Edward M. Basic Oxyacetylene Welding. Albany, NY: Delmar Publishers, 1960.

O'Brien, Michael. Demonstrations for Farm Mechanics. Danville, Illinois: The Interstate Printers and Publishers.

Wakeman, T.J. and McCoy, Vernon. The Farm Shop. New York: The MacMillan Company, 1960.

FILMS AND FILM STRIPS

Stanley Tool Company.
Write for instructional materials concerning the use of hand tools and power equipment.

BULLETINS

TRANSPARENCIES

UNIT: Harvesting Equipment Mechanics

SUB-UNIT: Engine Principles

OBJECTIVE(S): The student will be able to:

I. Diagram and/or describe in writing the manner in which the gasoline engine converts chemical energy into mechanical energy.

II. List the major systems of the internal combustion engine and state in writing the major function(s) of each.

III. Diagram the working principle fundamental to each of the major engine systems.

IV. Compare and contrast the basic principles of the gasoline and diesel engine.

V. ....

UNIT: Harvesting Equipment Mechanics
SUB-UNIT: Engine Principles

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Diagram and/or describe in writing the manner in which the gasoline engine converts chemical energy into mechanical energy.	I. Practice diagramming the basic strokes of the four-cycle engine.
A. List and diagram the four strokes of the four-cycle engine.	. Observe cut-away models of four-cycle engines.
B. List the function of each stroke of the four-cycle engine.	. ....
C.	
II. List the major systems of the internal combustion engine and state in writing the major function of each.	II. Practice diagramming the major engines systems, i.e., power production, carburetion, ignition, cooling, lubrication, etc.
A. Diagram and label the major components of each system and state in writing the function(s) of each.	. Prepare an ignition system model made of an old distributor coil and plugs.
B. Diagram and label the major parts of the engine contained within the block.	. Prepare a carburetor cut-away by sawing an old carburetor in half.
C.	. Illustrate the basic principles of carburetion with an atomizer.
III. Diagram the working principle(s) involved in each of the major systems (power production, carburetion, ignition, cooling, lubrication, etc.	. .....
	III. Observe and/or construct illustrations of the basic principles of the cooling system, e.g., surface area - observe the difference in water cooling in a large flat pan and water cooling in a pail.
	. Observe and/or perform demonstrations of the basic principles of lubrication system, e.g., cushioning, cooling, friction reduction, cleaning, sealing, etc. Construct a simple inclined plane and compare the effect of oiling to reduce friction. Illustrate cushioning by placing oil between two metal parts and striking with a hammer.
	. ....

UNIT: Harvesting Equipment Mechanics

SUB-UNIT: Engine Principles

TOPICS	RESOURCES
I. Engine Principles . Strokes . Intake . Compression . Ignition . Power	I. Bromley. Pulpwood Production. Unit H. . Deere and Co. Fundamentals of Service - Engines. pp. 1-19. . ....
II. Major systems . Power production (block) . Carburetion . Ignition . Lubrication . Cooling	II. Bromley. Pulpwood Production. Unit H. . Deere and Co. Fundamentals of Service - Engines. Chapters 3, 6, 7, and 8. . ....
III. Systems principles . Power . Carburetion . Ignition . Cooling . Lubrication . Exhaust & cleaning	III. Bromley. Pulpwood Production. Unit H. . Deere & Co. Fundamentals of Service - Engines. Chapters 3, 6, 7, 8. . ....

UNIT: Harvesting Equipment Mechanics
SUB-UNIT: Engine Principles

OBJECTIVES	LEARNING ACTIVITIES
IV. Compare and contrast the basic principles of the gasoline and diesel engine. A. Compare and contrast the ignition system. B. Compare and contrast the carburetion system. C. .... V.	IV. Practice diagramming the basic strokes of the diesel engine. . Observe illustrations of the diesel fuel injector system. . Observe and compare the piston rings in the diesel and gasoline engine. . .... V. ....

UNIT: Harvesting Equipment Mechanics
SUB-UNIT: Engine Principles

TOPICS	RESOURCES
IV. Diesel and gasoline engine principle comparison A. Ignition B. Caburetion C. ... V.	IV. Bromley. Pulpwood Production. Unit H. . Deere and Co. Fundamentals of Service - Engines. pp. 8 - 16. . .... V. ....

RESOURCES

UNIT: Harvesting Equipment Mechanics

SUB-UNIT: Engine and Major Systems Principles

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Deere and Co. Fundamentals of Service - Engines: Moline, Illinois: Deere and Company, 1968.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: Small Gasoline Engines

OBJECTIVE(S): The student will be able to:

I. Select an appropriate engine for a given purpose.

II. Show by diagrams the principles of the small gasoline engine and its major systems.

III. Disassemble, identify worn parts, repair or replace such parts and reassemble each of the major systems of a typical small gasoline engine.

IV. Tune up a typical small gasoline engine.

V. .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Small Gasoline Engine

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Select an appropriate engine for a given purpose.	I. As a class project, prepare a classification chart comparing various types and sizes of small gasoline engines.
A. Compare and contrast small gasoline engine systems.	. .....
1. Compare and contrast horse power ratings.	
2. Compare and contrast carburetor systems.	
3. Compare and contrast ignition systems.	
4. Compare and contrast starting systems.	
5.	
B. List the advantages and disadvantages of a given engine for a given purpose.	
C.	
II. Diagram the operational principles of the small gasoline engine and its systems.	II. Practice drawing and labeling the strokes of a two-cycle and four-cycle engine.
A. Diagram and/or label the strokes of a four-cycle engine.	. Diagram the basic principles of a typical carburetor.
B. Diagram and/or label the strokes of a two-cycle engine.	. Diagram the basic principle of a typical ignition system.
C. Illustrate by diagram the basic principle upon which a typical carburetor works.	. Diagram the basic principle of typical lubrication system.
D. Illustrate by diagram the basic principles upon which an ignition system works.	. Diagram the basic principle of the air cooling system.
E. Illustrate by diagram the basic principles upon which the lubrication system operates.	. .....

UNIT: Pulpwood Mechanics
SUB-UNIT: Small Gasoline Engine

TOPICS	RESOURCES
I. Engine selection.	I. AAVIM. Small Gasoline Engines, Vol. 1.
A. Combustion comparison.	. AAVIM. Small Gasoline Engines, Vol. 2.
. Two-cycle . Four-cycle	. .....
B. Type carburetor comparison.	
. Bowl . Vacuum	
C. Type ignition	
. Magneto . Battery-generator	
D.	
II. Working principles.	II. AAVIM. Small Gasoline Engines, Vol. 1.
A. Four-cycle engine	. AAVIM. Small Gasoline Engines, Vol. 2.
B. Two-cycle engine	
C. Carburetor	. .....
D. Ignition	
E. Lubrication	
F.	

UNIT: Pulpwood Mechanics

SUB-UNIT: Small Gasoline Engine

OBJECTIVES	LEARNING ACTIVITIES
III. Disassemble, identify worn parts, repair or replace such parts and reassemble each of the major systems of a typical small gasoline engine.	III. Observe a demonstration of and/or disassemble, identifyworn parts, repair or replace such parts and reassemble each of the major systems of a typical small gasoline engine.
A. Disassemble, identify worn parts, repair or replace such parts, and reassemble the ignition system of a typical small gasoline engine.	A. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts and reassemble the ignition system of a typical small gasoline engine.
B. Disassemble, identify worn parts, repair or replace such parts, and reassemble the carburetion system of a typical small gasoline engine.	B. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts and reassemble the carburetion system of a typical small gasoline engine.
C. Disassemble, identify worn parts, repair or replace such parts, and reassemble the block of a typical small gasoline engine.	C. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts, and reassemble the block of a typical small gasoline engine.
1. Remove, grind to specifications and replace intake and exhaust valves.	. Remove, grind to specifications and replace intake and exhaust valves.
2. Remove and replace rings according to specifications.	. Remove and replace rings.
3. Remove and replace a piston and rings on a typical small gasoline engine.	. Remove and replace piston and rings.
4.	. Remove and replace crankshaft, connecting rod and bearing.
	. .....
D.	D. .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Small Gasoline Engine

TOPICS	RESOURCES
III. Small engine repair . Ignition system . Carburetor . Block . Rings . Piston and rings . Piston, rings and bearing	III. Manufacturer's manual . VEMC. Small Gasoline Engine-Ignition System Repair. . VEMC. Small Gasoline Engine-Bowl-type Carburetor Repair. . AAVIM. Small Engines, Vol. 1. . AAVIM. Small Engines Vol. 2. . .....

UNIT: Pulpwood Mechanics
SUB-UNIT: Small Gasoline Engine

OBJECTIVES	LEARNING ACTIVITIES
IV. Tune up a typical small gasoline engine. A. Adjust a carburetor according to specifications for maximum performance. B. Adjust the timing according to specifications for maximum performance. C. ..... V.	IV. Practice carburetor adjustment. . Practice point and timing adjustments. . ..... V. .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Small Gasoline Engine

TOPICS	RESOURCES
IV. Small engine tune up. . Adjusting carebutor . Adjusting timing	IV. Owner's manual. . AAVIM. Small Engines,Vol. 1. . AAVIM. Small Engines,Vol. 2. . VEMC. Small Gasoline Engines Bowl-type Carburetor Repair. . VEMC. Small Gasoline Engines - Ignition System Repair. . .....
V.	V. .....

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: Small Gasoline Engine

BOOKS

American Association for Vocational Instructional Materials. Small Engines, Vol. 1. Athens, Georgia: The Association, 1971.

American Association for Vocational Instructional Materials. Small Engines, Vol. 2. Athens, Georgia: The Association, 1971.

Vocational Education Media Center. Small Gasoline Engines - Bowl-type Carburetor Repair. Clemson, South Carolina: The Center, 1972.

Vocational Education Media Center. Small Gasoline Engines - Ignition System Repair. Clemson, South Carolina: The Center, 1972.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

OBJECTIVE(S): The student will be able to:

I. Given an engine with a more common malfunction, identify the system in which the malfunction has occurred.

II. Given the necessary tools and equipment, disassemble a given system, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the system.

III. .....

UNIT: Pulpwood Mechanics
SUB-UNIT: Engine Trouble Shooting and Repair

OBJECTIVES	LEARNING ACTIVITIES
The student will be albe to:	
I. Given an engine with a more common malfunction, identify the system in which the malfunction has occurred.	I. Observe engine trouble shooting demonstrations.
A. Given the system in which one of the more common malfunctions has occureed, identify the malfunctioning component of that system with the aid of required diagnostic equipment.	. Participate in a trouble shooting contest.
	. Observe demonstrations of trouble shooting through the use of engine testing equipment.
B. List the major systems and the more frequently occurring malfunctions within each system.	. Practice the disassembly and reassembly of engine systems.
C.	. ....
II. Given the necessary tools and equipment to disassemble a given system, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the engine block assembly.	II. Observe demonstrations of and/or disassemble and reassemble an engine block.
A. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the engine block assembly.	. Practice the use of a micrometer for measuring wear.
	. As a class project, overhaul, or partially overhaul, an engine block, i.e., replace some major engine components such as the crankshaft or piston assembly.
1. Given the necessary tools and equipment, the student will be able to:	. Observe demonstrations of and/or perform some of the following tasks: (1) grind valves, (2) install rings on a piston, (3) install main bearings, (4) replace a sleeve, (5) replace a crankshaft.
a. use a micrometer to measure engine parts to determine wear.	. ....
b. remove, grind, and replace valves.	

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

TOPICS	RESOURCES
I. Trouble shooting A. Trouble identification . Without engine analyzer . With engine analyzer	I. Deere and Co. Fundamentals of Service-Engines. Chapter 2. . Local mechanics . .....
II. Trouble shooting and repairing a given system. A. Block assemble repair . Crankshaft replacement . Bearing replacement . Piston replacement . Piston ring replacement . Valve grinding or replacement	II. Deere and Co. Fundamentals of Service-Engines. Chapter 2. . Manufacturer's manuals . Local mechanics . .....

OBJECTIVES	LEARNING ACTIVITIES
c. remove and replace pistons, piston rings, and sleeves. d. remove and replace main and insert bearings. e. remove and replace a crankshaft and piston rod. f. repair or replace an oil pump. g. ..... 2.	
B. Given the necessary tools and equipment, the student will be able to disassemble, identify malfunctioning or worn parts, and repair or replace parts of the carburetor system. 1. Given the appropriate tools and equipment the student will be able to: a. adjust the carburetor. b. adjust the intake valves. c. install a carburetor kit. d. ..... 2.	B. Observe demonstrations of and/or disassemble and reassemble a carburetor and fuel pump. . Practice installing a carburetor kit. . Observe demonstrations of and/or adjust a carburetor. . Observe demonstrations of and/or adjust engine valves. . .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

TOPICS	RESOURCES
B. Carburetion trouble shooting and repair 1. Carburetor kit installation 2. Carburetor adjustment 3. Intake valve adjustment 4.	B. Manufacturer's manuals . AAVIM. Farm Tractor Tune-up and Service Guide. . Deere and Co. Fundamentals of Service-Engines. Chapter 3, page 8. . Local mechanics . .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

OBJECTIVES	LEARNING ACTIVITIES
C. Given the necessary tools and equipment, the student will be able to disassemble, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the ignition system. 1. Given the necessary tools and equipment, the student will be able to: a. test and charge a battery. b. test a coil. c. test a spark plug. d. clean a spark plug. e. test a plug wire. f. replace and adjust parts in a distributor. g. time an engine. h. ..... 2.	C. Observe demonstrations of and/or test a battery, spark plug, spark plug wire, coil, and condenser. . Practice cleaning and installing plugs. . Practice removing, replacing and adjusting breaker points. . Practice timing an engine ignition system. . .....
D. Given the necessary tools and equipment the student will be able to dissassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the lubrication system. 1. Given the necessary tools and equipment the student will be able to: a. test an oil pressure gauge. b. test an oil pump.	D. Observe demonstrations of and/or test an oil pressure gauge and oil pump. . Practice replacing an oil filter element. . .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

TOPICS	RESOURCES
C. Ignition system diagnosis and repair	C. Deere and Co. Fundamentals of Service-Engines. Chapter 9.
1. Testing	. Local mechanics
. Coils	. .....
. Condensers	
. Batteries	
. Spark plugs	
. Spark plug wires	
. .....	
2. Replacing and adjusting points	
3. Charging batteries	
4. Cleaning plugs	
5. Timing	
6.	
D. Lubrication system diagnosis and repair	D. Deere and Co. Fundamentals of Service-Engines. Chapter 7.
1. Oil pump testing	. Local mechanics
2. Filter replacement	. .....
3. Pressure gauge testing	
4.	

OBJECTIVES	LEARNING ACTIVITIES
c. replace an oil filter element. d. ..... 2.	
E. Given the necessary tools and equipment the student will be able to disassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the cooling system. 1. Given the necessary tools and equipment, the student will be able to: a. test a thermostat. b. replace a fan belt. c. test a water pump. d. replace a water pump. e. replace a radiator. f. ..... 2.	E. Observe demonstrations of and/or test a thermostat and temperature gauge. . Practice installing fan belts, water hoses, and water pumps. . .....
F. Given the necessary tools and equipment the student will be able to disassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the air cleaning system. 1. Given the necessary tools and equipment the student will be able to: a. remove and replace an air cleaner element.	F. Observe demonstrations of and/or replace and/or clean the air cleaner. . .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

TOPICS	RESOURCES
E. Cooling system diagnosis and repair 1. Testing and replacing water pumps 2. Testing and replacing thermostats 3. Replacing hoses 4. Replacing fan belts 5.	E. Deere and Co. Fundamentals of Service-Engines. Chapter 8. . Local mechanics . .....
F. Air cleaning system diagnosis and repair 1. Trouble identification 2. Repair . Replacing filters . Replacing hose connections . ..... 3.	F. Deere and Co. Fundamentals of Service-Engines. Chapter 6. . Local mechanics . Manufacturer's service manuals . .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

OBJECTIVES	LEARNING ACTIVITIES
b. replace hose connections. c. ..... 2. ..... G. Given the necessary tools and equipment the student will be able to disassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the exhaust system. 1. Given the necessary tools and equipment the student will be able to: a. replace a muffler. b. replace a tail pipe. c. replace a manifold gasket. d. ..... 2. ..... III.	G. Observe demonstrations of and/or remove and replace a muffler, tail pipe, and manifold gasket. . ..... III. .....

UNIT: Pulpwood Mechanics
SUB-UNIT: Engine Trouble Shooting and Repair

TOPICS	RESOURCES
G. Exhaust system diagnosis and repair 1. Trouble identification 2. Repair or replacement . Replacing exhaust pipe . Replacing tail pipe . Repacing manifold gasket	G. Deere and Co. Fundamentals of Service-Engines. Chapter 6. . Manufacturer's service manuals . Local mechanics . .....
III.	III. .....

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

BOOKS

American Association for Vocational Instructional Materials. Farm Tractor Tune-up and Service Specifications. Athens, Georgia: The Association, 1972.

Deere and Company. Fundamentals of Service-Engines. Moline, Illinois: Deere and Company, 1968.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: Hydraulics

OBJECTIVE(S): The student will be able to:

I. Identify the functions of a given machine which are performed hydraulically.

II. Diagram and/or otherwise describe the basic principle of a hydraulic system.

III. Diagram, label and state the function(s) of the components of a typical hydraulic system.

IV. Disassemble and reassemble a simple hydraulic system.

V. Trouble-shoot a typical hydraulic system.

VI. ....

UNIT: Pulpwood Mechanics
SUB-UNIT: Hydraulics

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Identify the functions of a given machine which are performed hydraulically.	I. Observe demonstrations of machine functions which are performed hydraulically.
A. Classify a given hydraulic system as to type, e.g., single action, double action, etc.	. Prepare a list of the functions performed hydraulically on a pulpwood machine such as the knuckle-boom loader.
B. List at least five tasks performed hydraulically by pulpwood harvesting equipment.	. Invite a local mechanic or equipment dealer to help classify the systems used as to type.
C.	. .....
II. Diagram and/or otherwise describe the basic principle of a hydraulic system.	II. Practice solving leverage problems using Pascal's law.
A. State Pascal's law.	. Ask the school physics teacher to demonstrate Pascal's law.
B. When given the small cylinder size and the weight applied to its piston, the student will (when given the size of the large cylinder) determine the weight lifted by its piston.	. ....
C.	

UNIT: Pulpwood Mechanics
SUB-UNIT: Hydraulics

TOPICS	RESOURCES
I. Functions performed by hydraulics . Vehicles . Brakes . Steering . ... . Vehicle accessories . Lifts . Grapples . Swings . Shears . Winch	I. AAVIM. Tractor Hydraulics. . Bromley. Pulpwood Production. Unit G. . Local harvesting equipment dealers . ....
II. Basic principles of hydraulics A. Pascal's law B. Leverage problems C. ...	II. Bromley. Pulpwood Production. Unit G. . Glenn and Bainn. Mobile Hydraulic Testing. Chapter I. . Local school physics or science teacher . School science or physics book . .....

UNIT: Pulpwood Mechanics
SUB-UNIT: Hydraulics

OBJECTIVES	LEARNING ACTIVITIES
III. Diagram, label and state the function(s) of the components of a typical hydraulic system. A. Diagram a typical check valve. B. Diagram a typical pump. C. Diagram a typical directional control valve. D. Diagram a typical relief valve. E. Diagram a typical flow control valve. F. Diagram a typical piston type cylinder. G.	III. Practice diagramming hydraulic circuits. . Design a hydraulic circuit and have it checked for corrections by the instructor. . If feasible, construct a very simple hydraulic ram - (tolerances must be close, but perhaps one could be made which would function). . ....
IV. Disassemble and reassemble a simple hydraulic circuit.	IV. Practice disassembling and reassembling a simple circuit.
V. Trouble-shoot a typical hydraulic system. A. List at least one cause of a noisy pump. B. List at least one cause of overheating. C. List at least one or two items to check when a pump malfuntions. D. List at least two items to check when pressure is low. E. Identify air and fluid leakage. F. Check fluid level. G. Check supply line. H.	V. Observe demonstrations of and/or demonstrate such things as: checking fluid level, checking for leaks, checking pressure, etc. . Obtain and/or prepare a trouble - shooting guide for a typical or particular hydraulic system. . Ask a local mechanic to discuss trouble shooting the hydraulic system. . ....
VI.	VI. ....

UNIT: Pulpwood Mechanics
SUB-UNIT: Hydraulics

TOPICS	RESOURCES
III. Hydraulic circuit . Pump . Cylinder . Valves . Check . Relief . Directional	III. AAVIM. Tractor Hydraulics. . Bromley. Pulpwood Production. Unit G. . Deere & Co. Fundamentals of Service - Hydraulics. . Glenn and Bainn. Mobile Hydraulic Testing. . Local pulpwood equipment mechanics or dealers . ....
IV. Disassembly and reassembly of the hydraulic system.	IV. Deere & Co. Fundamentals of Service - Hydraulics. . Local pulpwood equipment mechanics or dealers . ....
V. Trouble-shooting . Pumps . Valve . Line leakage . Fluid level	V. AAVIM. Tractor Hydraulics. . Bromley. Pulpwood Production. Unit G. . Deere & Co. Fundamentals of Service - Hydraulics. . Local equipment mechanics . Manufacturer's owner or service guides . ....
VI.	VI. ....

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: Hydraulics

BOOKS

American Association for Vocational Instructional Materials. Tractor Hydraulics. Athens, GA: The Association.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Deere and Company. Fundamentals of Service Hydraulics. Moline, Illinois: Deere and Company, 1967.

Glenn, Ronald E. and James E. Bainn. Mobile Hydraulic Testing. Chicago: American Technical Society, 1970.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: Major Systems of a Vehicle

OBJECTIVE(S): The student will be able to:

I. Diagram the major components and working principles of each of the major vehicle systems.

II. Recognize a malfunctioning or maladjusted vehicle system and make needed adjustment.

III. Disassemble, identify malfunctioning or worn parts, repair and replace such parts and reassemble a typical brake.

IV. .....

UNIT: Pulpwood Mechanics
SUB-UNIT: Major Systems of a Vehicle

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Diagram the major components and working principle(s) of each of the major vehicle systems.	I. Observe illustrations of and/or prepare diagrams of the major vehicle system.
A. Diagram the components and working principles of vehicle brakes.	. Disassemble and reassemble the brake assembly.
B. Diagram the components and working principles of the steering assembly.	. .....
C. Diagram the components and working principle of the clutch.	
D. Diagram the components and working principle of the transmission.	
E. Diagram the components and working principle of the differential.	
F.	
II. Recognize a malfunctioning or maladjusted vehicle system and make needed adjustments.	II. Observe demonstrations of maladjusted or malfunction vehicle systems.
A. Adjust a typical brake system.	. Locate the major vehicle adjustment.
B. Adjust a typical clutch.	. Practice making adjustments.
C. Adjust a typical steering assembly.	. .....
D.	

UNIT: Pulpwood Mechanics

SUB-UNIT: Major Systems of a Vehicle

TOPICS	RESOURCES
I. Vehicle systems . Brakes . Steering . Clutch . Transmission . Differential	I. AAVIM. Tractor Transmissions. . Deere and Co. Power Trains. . Manufacturers service manuals . Local mechanics . .....
II. Vehicle systems adjustment . Brake . Clutch . Steering	II. AAVIM. Tractor Maintenance. Part 3. . Manufacturer service manual . Local mechanics . .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Major Systems of a Vehicle

OBJECTIVES	LEARNING ACTIVITIES
III. Disassemble, identify malfunctioning or worn parts, repair or replace such parts, and reassemble a typical brake. A. Replace brake shces. B. Install a cylinder kit. C. ..... IV.	III. Observe demonstrations of and/or replace brake shoes and install a cylinder kit. . ..... IV. .....

UNIT: Pulpwood Mechanics

SUB-UNIT: Major Systems of a Vehicle

TOPICS	RESOURCES
III. Brake repair . Shoe replacement . Cylinder kit installation . ..... IV.	III. Manufacturer's service manual . ..... IV. .....

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: Major Systems of a Vehicle

BOOKS	FILMS AND FILM STRIPS
American Association for Vocational Instructional Materials. Tractor Maintenance. Athens, Georgia: The Association, 1964. Deere and Company. Fundamentals of Service-Engines. Moline, Illinois: Deere and Company, 1968.	
BULLETINS	TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: Machinery and Equipment Maintenance

OBJECTIVE(S): The student will be able to:

I. Plan a lubrication schedule for a given piece of machinery or equipment.

II. Select an appropriate lubricant for a given use.

III. Perform the major tasks involved in a typical lubrication program.

IV. Prepare a check list and schedule of miscellaneous maintenance for a given piece of machinery or equipment.

V. ....

UNIT: Pulpwood Mechanics

SUB-UNIT: Preventive Maintenance

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Plan a maintenance program for the machinery and equipment used in a given pulpwood harvesting operation.	I. As a class, small group, or individual project, plan a maintenance program for a local harvesting operation. . Ask a local producer to discuss his machinery and equipment maintenance program.
A. Plan a lubrication schedule for a given machine or a piece of equipment under given use conditions.	A. Individually or in small groups plan a lubrication program for a machine or piece of equipment.
1. Prepare a lubrication schedule for a machine, e.g., skidder, tree shear or loader under given use conditions.	. Obtain and use a manufacturer's lubrication schedule for lubricating a machine or piece of equipment.
2. Prepare a lubrication schedule for trucks under given use conditions.	. Determine the lubrication procedure used by a local producer.
3. Prepare a lubrication schedule for chain saws under given use conditions.	. .....
4. Obtain and interpret the manufacturer's lubrication schedule for a given vehicle or piece of equipment.	
5.	
B. Select an appropriate lubricant for a given use.	B. Obtain various greases and oils and compare them as to viscosity, etc.
1. List the major functions of a lubricant, e.g., cushion, seal, reduce friction, etc.	. Observe or perform demonstrations of the cushioning friction reduction, sealing, etc., effects of oil. . Make some "home made" grease using soap and oil. . Obtain oil cans and practice determining government classifications.

UNIT: Pulpwood Mechanics

SUB-UNIT: Preventive Maintenance

TOPICS	RESOURCES
I. Preventive Maintenance	I. AAVIM. Tractor Maintenance. . AAVIM. Farm Tractor Tune-up Specifications. . Manufacturer's lubrication guides . Local pulpwood machinery mechanics . ....
A. Planning a lubrication schedule 1. Machinery . Shears . Skidders . Loaders . Trucks . ... 2. Equipment . Chain saws	
B. Lubricant selection 1. Functions of lubricants a. Sealing b. Friction reduction c. Cushioning d. Cleaning e. Cooling f.	B. AAVIM. Selecting and Storing Tractor Fuels and Lubricants. . Deere & Co. Fundamentals of Service Fuels, Lubricants and Coolant. . American Petroleum Institute . Slides: AAVIM. Selecting and Storing Tractor Fuels and Lubricants.

OBJECTIVES	LEARNING ACTIVITIES
2. Compare and contrast lubricants. a. Differentiate between an oil and a grease. b. List the major oil classification. c. List at least 4 types of greases. d. Interpret a label to determine oil classification. e. .... 3. When given a specific bearing select the type of oil or grease needed. 4.	. Using a manufacturer's guide to lubrication try to explain the reasons for different greases and oils for different bearings and other surfaces to be lubricated. . ....
C. Perform the major tasks involved in a lubrication program. 1. Locate point of lubrication on a given vehicle or piece of equipment. a. Locate grease fittings b. Locate oil parts c. Transmission entrance d. ... 2. Select an appropriate means of greasing or adding oil. 3. Operate a grease gun. 4. Demonstrate the ability to correctly grease a fitting. 5. Check the oil level in an engine. 6.	C. Practice greasing a machine or piece of equipment using a grease gun. . Observe demonstrations of and/or practice loading a grease gun. . Practice locating fittings to be greased and oil entrance on a machine or piece of equipment. . ....

TOPICS	RESOURCES
2. Lubricant classification a. Types of greases . Water pump grease . Ball-and-roller bearing grease . Pressure gun grease . All-purpose grease . Multipurpose grease . ... b. Oils . Gear . Transmission . Hydraulic . Crank case . Weights - 10-20-30 . A.P.I. Classifications ML, MM, MS, DG	
C. Lubrication 1. Locating lubrication points . Locating fittings . Locating oil parts . ... 2. Selecting equipment 3. Operating grease guns 4. Checking oil level 5. ...	C. AAVIM. Tractor Maintenance. . Local Service Station operators . Local pulpwood equipment maintenance shop mechanics . Manufacturer's lubrication guides . ....

UNIT: Pulpwood Mechanics
SUB-UNIT: Preventive Maintenance

OBJECTIVES	LEARNING ACTIVITIES
D. Prepare a maintenance check list and schedule of miscellaneous items for a given piece of machinery or equipment, e.g., air filter change, water level, tire inflation, etc.	D. As a small group or individual class assignment prepare a miscellaneous maintenance check list and schedule for a machine or piece of equipment. . .... . Observe demonstrations of and/or demonstrate the more common maintenance items, e.g., change an air filter element. . ....
1. Perform the more common miscellaneous maintenance items. 1. Change an air cleaner filter. 2. Check tire inflation. 3. Check fan belts on engines. 4. ...	
2. Interpret a manufacturer's checklist or schedule of miscellaneous maintenance.	. Obtain and use a manufacturer's checklist of miscellaneous maintenance. . ....

UNIT: Pulpwood Mechanics

SUB-UNIT: Preventive Maintenance

TOPICS	RESOURCES
D. Miscellaneous maintenance checklist 1. Vehicles a. Electrical System . Battery . Distributor . Wiring . ... b. Cooling . Fan belt . Coolant level . Radiator . ... c. Carburetion . Gas lines . Carburetor sediment bowl . ... d. Air cleaner . Air cleaner element . Hoses . ... e. Tires f. Brakes g. Steering h. Hydraulic system i. ... 2. Equipment a. Chain saw . chain wear . ... b.	D. AAVIM. Tractor Maintenance. . AAVIM. Tractor Operation and Daily Care. . Local pulpwood equipment maintenance shop mechanics . Manufacturer's maintenance or service guides . Slides: AAVIM. Tractor Maintenance. . Slides: AAVIM. Tractor Operation & Daily Care.

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: Machinery and Equipment Maintenance

BOOKS

American Association for Vocational Instructional Material. Selecting and Storing Tractor Fuels and Lubricant. Athens, Georgia: The Association, 1964.

American Association for Vocational Instructional Materials. Tractor Maintenance. Athens, GA: The Association, 1964.

American Association for Vocational Instructional Materials. Tractor Operation and Daily Care. Athens, GA: The Association, 1967.

American Association for Vocational Instructional Materials. Farm Tune-up and Service Specifications. Athens, GA: The Association, 1972.

Deere and Co. Fundamentals of Service Fuels, Lubricants and Coolants. Moline, Illinois: Deere and Company, 1970.

FILMS AND FILM STRIPS

Slides: American Association for Vocational Instructional Materials, Athens,

1. Selecting and Storing Tractor Fuel and Lubricants.
2. Tractor Maintenance.
3. Tractor Operation and Daily Care.

BULLETINS

TRANSPARENCIES

UNIT: Pulpwood Mechanics

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in pulpwood mechanics with those in other areas of forestry.

II. List the ways in which a given job in pulpwood mechanics might complement or fail to complement life goals.

III. ....

UNIT: Pulpwood Mechanics
SUB-UNIT: Exploring Careers

OBJECTIVES	LEARNING ACTIVITIES
The student will be able to:	
I. Compare and contrast career opportunities in pulpwood mechanics with those in other areas of forestry.	I. Interview as many people employed in pulpwood mechanics as is feasible.
A. List the major job titles related to pulpwood mechanics.	. Prepare a detail job analysis of a job of particular interest.
B. Classify these jobs as to level, i.e., professional, technical, service, etc.	. Practice as many of the tasks preformed by employees hoiding these jobs as is feasible.
C. List the major competencies needed for a career in pulpwood mechanics.	. Arrange to spend a day,or portion of a day,with a person employed in pulpwood mechanics.
D. List the major activities performed by persons employed in pulpwood mechanics.	. Seek occupational work experience as a pulpwood mechanic's aide.
E. List the educational requirements and sources of such training.	. Investigate with your teacher or guidance counselor the possibility for further training and job opportunities in the local area.
F.	. ....
II. List the ways in which a given job in pulpwood mechanics might complement or fail to complement life goals.	II. Prepare a short paper concerning the ways in which a job in pulpwood mechanics might complement or fail to complement life goals.
A. List at least five ways in which a career in pulpwood mechanics might benefit society.	. Participate in a class debate of life goals.
B. List at least five ways in which a career in pulpwood mechanics might benefit an individual.	. Investigate the living conditions and life style of a person employed in pulpwood mechanics.
C.	. ....
III.	III. ....

UNIT: Pulpwood Mechanics
SUB-UNIT: Exploring Careers

TOPICS	RESOURCES
I. Careers in pulpwood mechanics	I. Local pulpwood producer
A. Career titles	. Local school guidance counselor
. Shop foreman . Welder . Machinist . Mechanic	. Local pulpwood mechanics . ....
B. Career classification	
. Professional . Technical . Skill	
C. Competencies needed	
D. Major activities	
E. Educational requirements	
F. ...	
II. Career evaluation	II. Hoover. Handbook of Agricultural Occupations. Chapter 1.
A. Life goals	. Local school guidance counselor
B. Benefits to society	. ....
C. Benefits to the individual	
D. ...	
III.	III. ....

RESOURCES

UNIT: Pulpwood Mechanics

SUB-UNIT: Exploring Careers

BOOKS	FILMS AND FILM STRIPS
Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.	
BULLETINS	TRANSPARENCIES

APPENDIX A

Facilities and Equipment

Facilites:

Regular Ag. Ed. classroom
Access to the Ag. Ed. shop
Access to bus for field trips
Access to a forestry plot

General Equipment:

Equipment by Unit:

Buying Pulpwood Timber

Transit (1)
Biltmore sticks (10)
Diameter tapes (10)
Clinometer (1)
International rule (1)
Doyle rule (1)
Scribner rule (1)
Compasses (10)
Chain tapes (5)
Hand paint spray guns (5)

Harvest Planning and Management

No special equipment needed

Harvest Operations

Hard hats (15)

Bow-blade chain saws (1)

Straight-blade chain saws (1)

Axes (5)

Steel wedges (2)

Cant hook (1)

Access to:

- Hydraulic shears
- Skidders
- Prehaulers
- Loaders
  - Fork-lift type
  - Knuckle-boom type (actual or scale model)
  - .....
- Trucks

Pulpwood Mechanics

If agricultural mechanics is taught in the school, additional equipment will probably not be needed.

APPENDIX B

Professional and Technical Societies, Organizations, and Agencies concerned with Forestry and/or Pulpwood Harvesting.

The following list is incomplete. Inclusion does not imply approval; omission does not imply disapproval. Teachers or students may obtain helpful information by writing the executive secretary of the respective organizations.

United States:

Professional Organizations:

American Forestry Institute, 1835 K Street, N. W., Washington, DC 20006.
American Forest Products Industries, 1816 N Street, N. W., Washington, DC 20006.
The American Forest Association, 1319 18th Street, N. W., Washington, DC 20036.
American Pulpwood Association, 605 Third Avenue, New York, NY 10016.

Agencies:

U. S. Forest Service, South Agriculture Building, Washington, DC 20250.
Southeastern Area, State and Private Forestry, U. S. F. S., 50 Seventh Street, N.E., Atlanta, Ga. 30323.
Region 8, U. S. F. S., 50 Seventh Street, N.E., Atlanta, Ga. 30323.
Southeastern Forest Experiment Station, U. S. F. S., Post Office Building, P.O. Box 2570, Asheville, NC 28802.
Southern Forest Experiment Station, U. S. F. S., T-10210 Federal Building, 701 Loyola Avenue, New Orleans, La. 70113.

South Carolina:

State Commission of Forestry, 5500 Broad River Road, Columbia, SC 29202.

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Farm Tractor Tune-up and Service Specifications, 1972.
Selecting and Storing Tractor Fuels and Lubricant, 1964.
Small Engines, Vol. 1, 1971.
Small Engines, Vol. 2, 1971.
Tractor Hydraulics.
Tractor Maintenance, 1964.
Tractor Operation and Daily Care, 1967.

Anderson, D. A. and William A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bender, Ralph E.; Clark, Raymond and Taylor, Robert E. The FFA and You. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1962.

Binkley, Harold and Hammonds, Carsie. Experience Programs for Learning Vocations in Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

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Deere and Company. Moline, Illinois: Deere and Company.
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Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

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Miller, Texton R. Supervised Practice in Vocational Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc.

O'Brien, Michael. Demonstrations for Farm Mechanics. Danville, Illinois: The Interstate Printers and Publishers.

Vocational Education Media Center. Clemson, South Carolina: The Center, 1972.
Small Gasoline Engines - Bowl-type Carburetor Repair.
Small Gasoline Engines - Ignition System Repair.

Wakeman, T. J. and McCoy, Vernon. The Farm Shop. New York: The MacMillan Company, 1960.

Bulletins:

Omark Industries, Oregon Saw Chain Division. All About Chain Saws.

S. C. State Commission of Forestry. Familiar Trees in South Carolina. A manual for Tree Study. Bulletin 117, P.O. Box 287, Columbia, S. C. 29202

Films and Filmstrips:

American Association for Vocational Instructional Materials, Athens, Ga. (Slides)

1. Selecting and Storing Tractor Fuel and Lubricants.
2. Tractor Maintenance.
3. Tractor Operation and Daily Care.

Colonial Films, Atlanta, Ga.

Identifying Common Tree Species. Filmstrip I, II, and III.
Marketing Timber. Filmstrip

Stanley Tool Company. Write for instructional materials concerning the use of hand tools and power equipment.